

# Underutilization of Statins and Aspirin Following Coronary Artery Bypass Graft Surgery

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## Introduction

Coronary artery bypass graft (CABG) surgery continues to be an important procedure for the treatment of coronary artery disease. However, clinically significant stenoses and complete bypass graft occlusion rates remain high, especially among saphenous vein grafts<sup>1</sup>. This is associated with significant morbidity and mortality. Both statin medications and aspirin have been shown in numerous clinical trials to play an important role in the medical management of coronary artery disease following CABG surgery. As per the ACC/AHA guidelines, both statin medications and aspirin have class I indications to support their use indefinitely following CABG, unless contraindication exists<sup>2</sup>. Long term studies evaluating statin and aspirin usage rates following CABG procedures are lacking.

### Purpose

The goal of this study was to assess the usage rates of statins and aspirin in post-CABG patients undergoing coronary angiograms. Further analysis was done to assess the clinical and laboratory differences among the populations based on medication usage group.

## Methods

We performed a retrospective analysis of the Thomas Jefferson University Hospital medical and electronic records from April 2003 through August 2011 for all patients with a history of CABG undergoing a diagnostic catheterization for the first time since index surgery. Clinical information, including age, gender, surgical history, medications, indication for catheterization, and relevant laboratory data, was obtained from both inpatient and outpatient electronic medical records.

### Exclusion criteria

CABG < three years prior to the index catheterization, lipid panel > thirty days prior to or > seven days after the index catheterization, and incomplete details of the catheterization. 829 patients were identified from the cardiac catheterization database initially, of which 381 were analyzed based on the exclusion criteria.

### Statistical analysis

Continuous variables are presented as mean  $\pm$  standard deviation (SD), and were analyzed using factorial analysis of variance. Categorical variables are displayed as a percentage of the target population, and were compared using Chi-square statistics. Statistical analysis was performed using SPSS software, version 19 (IBM).

## Results

The study population consisted of 381 consecutive patients who presented on average  $11 \pm 6$  years from the time of CABG. Mean age of our study population was  $69 \pm 11$  years with 78% male. The most common indications for catheterization were unstable angina (36%), non-STEMI (22%), and an abnormal stress test (15%). Only 67% of patients were being prescribed a statin, while 75% were prescribed aspirin. Only 52% were prescribed both at the time of catheterization. 3% had a documented intolerance to statin therapy. Patients prescribed a statin had a significantly lower mean LDL (87 vs. 106 [ $p < 0.01$ ]) and total cholesterol values (151 vs. 162 [ $p < 0.01$ ]). 35% of patients had LDL  $\geq 100$ . Only 43% of saphenous vein grafts among the patients not on statin medications remained patent an average of 11 years post-CABG surgery.

Table 1. Baseline Patient Characteristics (n=381)

Variable	Mean $\pm$ SD or %
Age	69 $\pm$ 11.33
Male	78%
Diabetes	43%
Hypertension	74%
Current Smoker	14%
Mean Years From CABG	11 $\pm$ 6.43
Total Cholesterol	156 $\pm$ 43
LDL	94 $\pm$ 36
HDL	37 $\pm$ 11
Triglyceride	134 $\pm$ 89
GFR	62 $\pm$ 23
Statin Use	67%
Prior Intolerance to Statin	3%
Aspirin Use	75%
Combined Statin and Aspirin Use	52%

Figure 1. LDL control based on Adult Treatment panel (ATP) III guidelines.

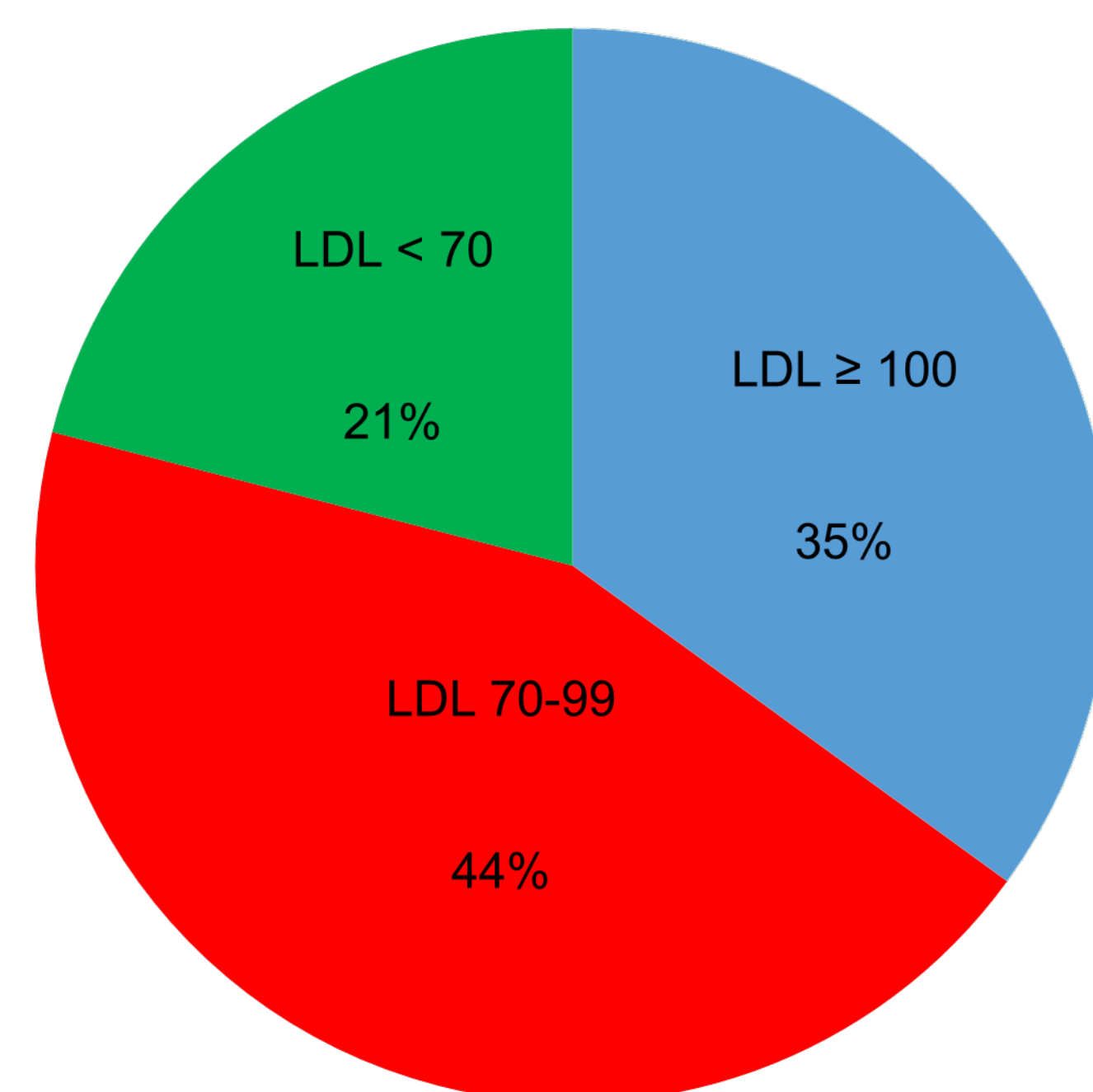


Table 2. Indication for cardiac catheterization by medication usage.

Indication	Statin	No Statin	Aspirin	No Aspirin
STEMI	5%	2%	4%	5%
NSTEMI	22%	20%	21%	27%
Unstable Angina	36%	32%	36%	28%
Chronic Angina	16%	16%	16%	14%
Abnormal Stress Test	12%	23%	15%	15%
Heart Failure	7%	6%	6%	9%
Aortic Valve Disease	2%	1%	2%	2%

Table 3. Clinical characteristics by statin status.

Clinical Characteristic	Statin		p Value
	Yes	No	
Mean Age	69 $\pm$ 10	71 $\pm$ 9	0.265
Male	78%	80%	0.681
Indication ACS <sup>a</sup>	63%	55%	0.175
Diabetes	47%	37%	0.127
Hypertension	76%	70%	0.276
Tobacco use	13%	16%	0.412
Aspirin	78%	72%	0.267
Dual Antiplatelet Therapy <sup>b</sup>	24%	16%	0.150
Mean Total Cholesterol	151 $\pm$ 35	162 $\pm$ 49	<b>0.024</b>
Mean LDL	87 $\pm$ 28	106 $\pm$ 40	<b>0.000</b>
Mean HDL	37 $\pm$ 11	34 $\pm$ 11	0.091
Mean Triglyceride	134 $\pm$ 80	118 $\pm$ 73	0.107
LDL $\geq 100$	26%	53%	<b>0.000</b>
GFR	62 $\pm$ 23	59 $\pm$ 26	0.398

a. Acute Coronary Syndrome  
b. Aspirin + Clopidogrel

Table 4. Clinical characteristics by aspirin status.

Clinical Characteristic	Aspirin		p Value
	Yes	No	
Mean Age	70 $\pm$ 10	70 $\pm$ 9	0.868
Male	79%	79%	0.957
Indication ACS <sup>a</sup>	61%	59%	0.873
Diabetes	44%	43%	0.906
Hypertension	75%	69%	0.320
Tobacco use	13%	17%	0.347
Statin Use?	69%	60%	0.165
Clopidogrel Use?	23%	16%	0.195
Warfarin Use?	10%	32%	<b>0.001</b>
Mean Total Cholesterol	155 $\pm$ 41	153 $\pm$ 38	0.620
Mean LDL	93 $\pm$ 35	92 $\pm$ 31	0.776
Mean HDL	36 $\pm$ 12	35 $\pm$ 10	0.404
Mean Triglyceride	130 $\pm$ 90	133 $\pm$ 78	0.800
LDL $\geq 100$	36%	31%	0.517
GFR	62 $\pm$ 24	57 $\pm$ 24	0.131

a. Acute coronary syndrome

## Discussion

### Statin Usage

In our study population, only 67% of patients were being prescribed a statin at the time of catheterization. Despite the large percentage of patients not on a statin, only 3% of patients had a documented intolerance to statin therapy. Prior studies have demonstrated similar suboptimal usage rates of statins following CABG surgery. Kulik et al found overall statin prescription fill rates to be 35.9% among 9284 Medicare patients from 1995-2004. There was a significant increase from 13.1% in 1995 to 60.9% in 2004<sup>3</sup>. Newby et al showed similar increase in statin use from 25% in 1995 to 63% in 2002 among thousands of patients in the Duke Database for Cardiovascular Disease<sup>4</sup>. Delacretaz found among patients undergoing CABG or percutaneous coronary intervention with elevated total cholesterol levels, only 38% were on lipid lowering medications<sup>5</sup>.

### Aspirin Usage

The rate of aspirin utilization was also suboptimal at 75%, with only 52% of patients on both statin and aspirin therapy. These findings are consistent with previous studies. Can et al showed the rate of aspirin use at hospital admission was 82% among 72 patients with a mean of 5.6 years following CABG surgery<sup>6</sup>. Similar findings in Europe by the EUROASPIRE II study group showed 86% of 5556 patients identified as having CAD were still taking aspirin an average of 1.4 years following hospital discharge<sup>7</sup>.

## Conclusions

Long-term statin and aspirin use following CABG surgery remains suboptimal despite clear guideline recommendations and clinical trial evidence of their effectiveness. Coordinated efforts are needed to improve long-term medication usage in this subset of high risk patients.

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