Impact of Statin Prescription and Intensity at Discharge after an Atherosclerotic Cardiovascular Disease (ASCVD) Event—Real-World Experience in a Large Integrated Healthcare System: The IMPRES Study

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BACKGROUND

Statins are indicated for ASCVD, with high or moderate intensity dosing recommended and determined by age and tolerance. However, multiple surveys have found large treatment gaps in clinical application. We sought to determine the prevalence and importance of statin prescription and dose intensity at discharge after an ASCVD event.

HYPOTHESIS

We hypothesized that statin prescription and intensity at discharge after an ASCVD event would predict future ASCVD risk in a large, integrated healthcare system.

METHODS

The Intermountain Enterprise Data Warehouse was searched between January 1, 1999 and December 31, 2013 to identify all adults with a first ASCVD event who survived the index hospitalization, had ≥2 encounters ≥12 months apart, and were followed for ≥3 years or until death.

ASCVD events were defined as:

- Coronary artery disease (CAD): primary inpatient CAD or MI diagnosis or documented PCI or CABG
- Cerebrovascular disease (CVD): primary inpatient ischemic stroke diagnosis or documented carotid endarterectomy or stenting
- Peripheral artery disease (PAD): primary inpatient PAD diagnosis, documented aortic aneurysm repair, or peripheral arterial revascularization (bypass or percutaneous intervention)

Statin use was defined as receiving a statin prescription at discharge, within 30 days of discharge if statin naïve, or within 90 days if receiving statin therapy prior to the ASCVD event.

MACE was defined as the occurrence of all-cause death, myocardial infarction (MI), stroke, or follow-up revascularization. Revascularization was defined as a percutaneous coronary intervention (PCI) or bypass graft surgery (CABG) 60 days or more post-acute coronary event, aortic repair, carotid endarterectomy or stent, or peripheral stent or bypass.

Multivariable Cox hazard regression was used to determine the association of statin prescription and intensity at discharge with MACE. Follow-up averaged 6.4±4.7 years.

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RESULTS

- 62,070 patients met entry criteria.
- Age averaged 66 ± 13 years; 65% were men (Table 1).
- 69.3%, 18.6%, and 12.1% entered with CAD, CVD, and PAD.
- A statin was prescribed to 70.5%, with 7.7%, 75.8%, and 16.5% of the 39,619 (64%) with known intensity receiving low, moderate, and high-intensity doses (Table 2).
- Statin prescription varied by ASCVD group, with the highest rates in the CAD group.
- Of those <76 years old (73.8%), only 12.9% on known intensity statin received high-intensity dosing, which is recommended by current guidelines.
- Rates of 3-year MACE (death, MI, stroke, and revascularization) are shown in Table 3 and Figure 2.
- Statin prescription, particularly high intensity, was associated with reduced MACE both before and after multivariable adjustment (Table 3).

TABLE 1. BASELINE DEMOGRAPHICS STRATIFIED BY STATIN THERAPY

	No Statin (n=18,333)	Statin (n=43,737)	p-value
Group			<0.0001
CAD	7,517 (41.0%)	35,529 (81.2%)	
CVD	5,411 (29.5%)	6,130 (14.0%)	
PAD	5,405 (29.5%)	2,078 (4.8%)	
Age (years)	66.2±16.3	65.8±12.4	0.001
Sex (male)	10,004 (54.6%)	30,151 (68.9%)	<0.0001
Race (white)	16,385 (89.4%)	39,181 (89.6%)	0.44
Hypertension	11,440 (62.4%)	30,824 (70.5%)	<0.0001
Hyperlipidemia	6,729 (36.7%)	29,886 (68.3%)	<0.0001
Diabetes	4,352 (23.7%)	13,162 (30.1%)	<0.0001
Smoking	5,617 (30.6%)	16,038 (36.7%)	<0.0001
Renal failure	1,539 (8.4%)	2,966 (6.8%)	<0.0001
Heart failure	2,919 (15.9%)	6,977 (16.0%)	0.93
Atrial fibrillation	2,547 (15.5%)	7,322 (16.7%)	<0.0001
Prior cancer diagnosis	2,086 (11.4%)	4,387 (10.0%)	<0.0001
Charlson comorbidity index	3.0±2.3 (median: 2.0)	2.8±2.1 (median: 2.0)	<0.0001
BMI (kg/m²), n=57,269	27.9±6.6	29.3±6.4	<0.0001
LDL-C at hospitalization (mg/dL), n=35,186	100.1±33.5 (n=5,780)	101.7±36.5 (n=29,406)	0.002

TABLE 2. PATIENT DEMOGRAPHICS STRATIFIED BY FIRST INTENSITY OF STATIN RECEIVED. PRESENTED AS NUMBER (%) OR MEAN AND SD

	Low intensity (n=2,759)	Mod. intensity (n=30,291)	High intensity (n=6,569)	p-value
Group				<0.0001
CAD	1,973 (6.2%)	24,288 (76.9%)	5,310 (16.8%)	
CVD	570 (9.4%)	4,467 (73.8%)	1,014 (16.8%)	
PAD	216 (10.8%)	1,536 (76.9%)	245 (12.3%)	
Age (years)	69.2±12.5	65.8±12.4	63.7±12.5	<0.0001
Sex (male)	1,717 (62.2%)	20,893 (69.0%)	4,650 (70.8%)	<0.0001
Hypertension	2,037 (73.8%)	21,310 (70.4%)	4,947 (75.3%)	<0.0001
Dyslipidemia	1,892 (68.6%)	20,512 (67.7%)	5,152 (78.4%)	<0.0001
Diabetes	837 (30.3%)	9,168 (30.3%)	2,107 (32.1%)	0.02
Smoking	1,013 (36.7%)	11,172 (36.9%)	2,570 (39.1%)	0.003
Entry LDL-C n=26,402	96.0±32.5 (n=1,750)	101.8±36.2 (n=20,368)	101.2±38.8 (n=4,961)	<0.0001

TABLE 3. FREQUENCY AND MULTIVARIABLE HAZARD RATIOS (HR) OF 3-YEAR MACE BY STATIN VS. NO-STATIN PRESCRIPTION AND BY STATIN INTENSITY

Statin vs. no statin prescription0				
	Total	No statin	Statin	p-value
Frequency, n (%)	17,693/62,070 (28.5%)	6,205/18,333 (33.8%)	11,488/43,737 (26.3%)	<0.0001
Univariable HR=0.73 (0.71, 0.75), p<0.0001				
Multivariable HR=0.91 (0.88, 0.94), p<0.0001				
Statin prescription by intensity*				
	Total	Low statin intensity	Moderate statin intensity	High statin intensity	p-value
Frequency, n (%)	10,340/39,619 (26.1%)	828/2,759 (30.0%)	7,949/30,291 (26.2%)	1,563/6,569 (23.8%)	<0.0001
		Univariable HR		Multivariable HR	
Moderate vs. low		HR=0.86 (0.80, 0.92), p<0.0001		HR=0.94 (0.88, 1.01), p=0.11	
High vs. low		HR=0.78 (0.71, 0.84), p<0.0001		HR=0.91 (0.84, 0.99), p=0.03	

FIGURE 1. DISTRIBUTION OF STATIN PRESCRIPTION AND INTENSITY BY ASCVD GROUP

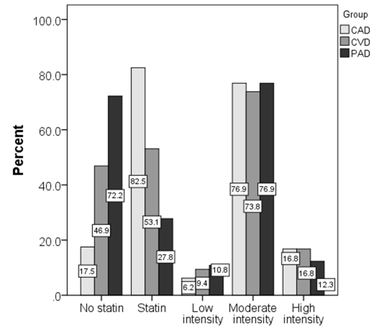
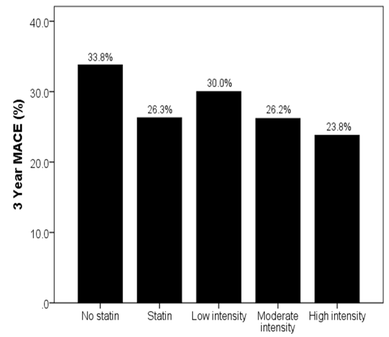


FIGURE 2. THREE-YEAR MACE BY STATIN PRESCRIPTION AND INTENSITY



CONCLUSIONS

- In a large, integrated healthcare system, significant reductions in MACE were found in association both with any statin prescription and especially with high-intensity statin following an ASCVD event in a large real-world experience.
- Statin prescription rates varied by ASCVD group, with the highest rates noted in the CAD group.
- The treatment gaps of 30% overall for receipt of a statin and, especially, up to 87.1% for high-intensity statin in those <76 years old, in whom it is guideline-recommended, represent prime targets to advance secondary ASCVD prevention.