

The Large Gap Between Statin Eligibility and Prescription in the NA-ACCORD

Abstract:
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Background

- People living with HIV (PLWH) have a higher risk of cardiovascular disease (CVD) as compared with uninfected adults
- Statins are hypothesized to impact traditional CVD risk factors, such as low-density lipoprotein (LDL) cholesterol, and may impact HIV-specific mechanisms, such as inflammation and immune activation, perhaps resulting in a lower CVD risk profile
- Statin eligibility is based on general population-based guidelines (not modified for PLWH)
- **Objectives of this study:** 1) To estimate trends in a) statin prescription overall and b) the statin treatment gap. 2) To determine factors associated with a) statin prescription and b) being indicated but not prescribed statins among PLWH.

Methods

- **Study period:** 1 Jan 2001 – 31 Dec 2013
- **Study population:** Participants from 15 dynamic clinical cohorts (n=2 Canadian, n=13 US) in the NA-ACCORD
- **Outcomes of Interest**
 - **Statin Prescription:** first statins prescription (prescribed for ≥1 month) among those under observation (N=86,535)
 - Under-ascertainment of statin prescription is possible
 - **Statin Treatment Gap:** not prescribed statins at, within 6 months after, indication according to ATP III guidelines, as is appropriate for the calendar years of the study period (N=45,513)
 - ATP III guidelines: ≤1 risk factors and LDL ≥190 mg/dL, OR ≥2 risk factors with 10-year predicted Framingham Risk Score (FRS) ≤20% and LDL ≥130 mg/dL, OR diabetes and FRS >20% and LDL ≥130 mg/dL
- **Potential Risk Factors for statin prescription and the statin treatment gap**
 - Time fixed: sex, race and ethnicity, HIV transmission risk, hepatitis C infection, ever/never smoking
 - Time-varying: age, treated hypertension, high (≥160 mmHg) systolic blood pressure, low (≤40 mg/dL) HDL, high (≥130 mg/dL) LDL, high (≥240 mg/dL) total cholesterol, diabetes, high Framingham Risk score (≥20%), high (≥350 cells/mm³) CD4 cell count, undetectable (≤200 copies/mL) HIV RNA, history of clinical AIDS diagnosis, protease inhibitor (PI) based HIV treatment regimen
- **Analysis**
 - Participants contributed to analyses between *study entry* (date of enrollment into the NA-ACCORD or 1 Jan 2001, whichever came later) and *study exit* (outcome of interest, death date, last CD4 or HIV RNA measurement + 2 years as a surrogate for lost to follow-up, or 31 Dec 2013, whichever came first)
 - Log binomial regression models with generalized estimating equations for repeated measures and an ordinal variable for time were used to estimate the p-value for trend
 - Discrete time-to-event pooled logistic regression models were used to estimate adjusted hazard ratios (aHR) and 95% confidence intervals (95% CI) for each outcome

Conclusions

- Although the gap is narrowing, there is still a substantial gap between those indicated and those prescribed statins
 - Older, white, MSM, HCV-uninfected, with higher CD4 counts, undetectable HIV RNA, with clinical AIDS and a non-PI-based regimen were more likely to be prescribed statins
 - Younger, black, smokers with lower CD4 counts and a PI-based regimen were more likely to be in the statin treatment gap
- Given the increased risk of CVD in HIV-infected adults, further narrowing the statin treatment gap may preserve the health of those aging with HIV

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Results

Table 1: Characteristics at study entry, stratified by whether participants were ever prescribed statins (≥1 month) while under observation (2001-2013)

Characteristic	Never Prescribed N=76,313		Prescribed N=10,222	
	n	%	n	%
Age ≥50 years	13,703	18%	3,679	36%
Male	59,273	78%	8,357	82%
Race/ethnicity				
White	28,235	37%	4,785	47%
Black	30,853	40%	3,303	32%
Hispanic	12,304	16%	1,663	16%
Other/Unknown	4,921	6%	471	5%
Men who have sex with men	39,144	51%	5,797	57%
HCV infection	13,915	18%	1,574	15%
Ever a cigarette smoker	37,742	49%	5,282	52%
Low HDL (≤40 mg/dL)	16,000	21%	2,937	29%
High LDL (≥130 mg/dL)	5,220	7%	1,950	19%
High total cholesterol (≥240 mg/dL)	4,109	5%	2,227	22%
Framingham risk score ≥20%	777	1%	538	5%
CD4 count (cells/mm ³) ≥350	32,238	42%	5,040	49%
Undetectable HIV RNA (≤200 copies/mL)	20,236	27%	4,079	40%
History of clinical AIDS diagnosis	13,302	17%	2,257	22%
PI-based ART regimen	19,153	25%	3,874	38%

Bold signifies a difference ≥5%.

Figure 1: Trends in statin treatment gap (the difference between those indicated according to ATP III and prescribed statins), 2001-2013

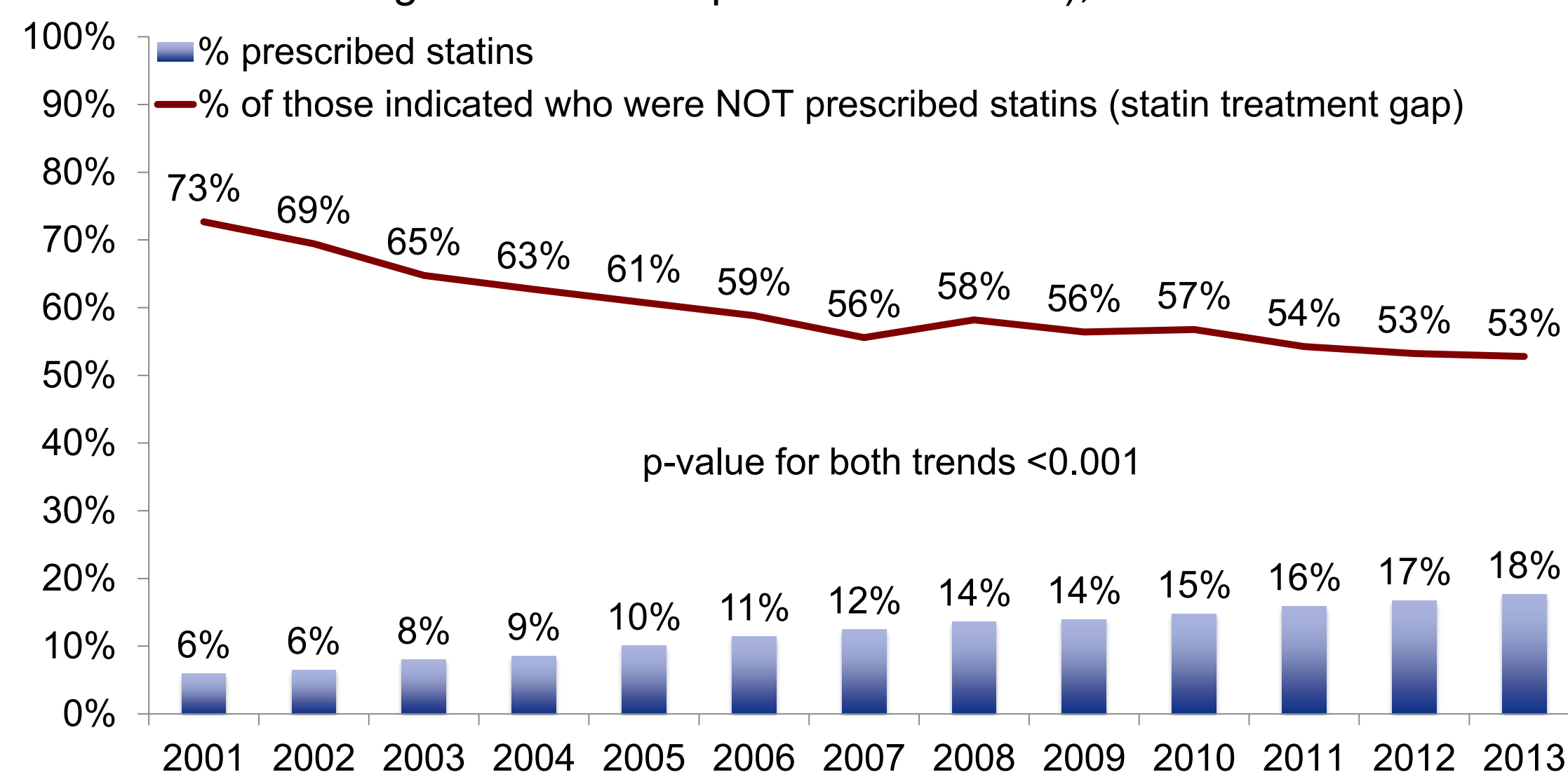


Table 2: Factors associated with statin treatment gap and statin prescription without indication (2001-2013)

Predictor	Prescribed (vs. not prescribed statins), among all participants N=86,353		In the gap (vs. not in the gap), among those indicated N=7,265	
	aHR	95% CI	aHR	95% CI
Age				
<40	0.36	0.33 , 0.38	1.61	1.38 , 1.88
40-49	1.00	--	1.00	--
50-59	1.62	1.54 , 1.69	1.12	1.00 , 1.26
60-69	2.31	2.15 , 2.48	0.97	0.80 , 1.16
Sex				
Male	1.00	--	1.00	--
Female	0.81	0.75 , 0.88	0.79	0.64 , 0.97
Race/ethnicity				
White	1.00	--	1.00	--
Black	0.55	0.52 , 0.59	1.22	1.05 , 1.42
Hispanic	0.87	0.80 , 0.94	1.12	0.91 , 1.39
Other/Unknown	0.78	0.70 , 0.88	1.18	0.91 , 1.53
HIV transmission risk				
MSM	1.00	--	1.00	--
IDU	0.70	0.63 , 0.77	1.24	0.96 , 1.59
Heterosexual	0.94	0.88 , 1.02	1.06	0.88 , 1.26
Other/Unknown	0.95	0.85 , 1.06	0.84	0.66 , 1.07
HCV status				
Uninfected	1.00	--	1.00	--
Infected	0.55	0.51 , 0.60	1.11	0.93 , 1.31
Smoking				
Ever	1.00	--	1.00	--
Never	0.90	0.84 , 0.97	0.60	0.52 , 0.69
CD4 count (cells/mm ³)				
≥350	1.00	--	1.00	--
200-349	0.74	0.71 , 0.77	1.06	0.96 , 1.18
<200	0.53	0.50 , 0.57	1.26	1.07 , 1.49
HIV viral load (copies/mL)				
≤200 (undetectable)	1.00	--	1.00	--
>200	0.79	0.76 , 0.82	1.10	0.98 , 1.22
History of clinical AIDS diagnosis				
No	1.00	--	1.00	--
Yes	1.15	1.08 , 1.21	0.97	0.86 , 1.10
HIV treatment regimen				
Non-PI HAART	1.00	--	1.00	--
PI-based	0.73	0.70 , 0.77	1.26	1.10 , 1.44
Non-HAART or no ART	1.04	1.00 , 1.10	1.02	0.92 , 1.15

Bold signifies p<0.05.

Adjusted for treated hypertension, systolic blood pressure, HDL, LDL, total cholesterol, diabetes, and high Framingham Risk score.