

Brand Name Statin Prescribing in a Resident Ambulatory Practice: Implications for Teaching Cost-Conscious Medicine

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Abstract

Background Several national initiatives aim to teach high-value care to residents. While there is a growing body of literature on cost impact of physicians' therapeutic decisions, few studies have assessed factors that influence residents' prescribing practices.

Objective We studied factors associated with intensive health care utilization among internal medicine residents, using brand name statin prescribing as a proxy for higher-cost care.

Methods We conducted a retrospective, cross-sectional analysis of statin prescriptions by residents at an urban academic internal medicine program, using electronic health record data between July 1, 2010, and June 30, 2011.

Results For 319 encounters by 90 residents, patients were given a brand name statin in 50% of cases. When categorized into quintiles, the bottom quintile of

residents prescribed brand name statins in 2% of encounters, while the top quintile prescribed brand name statins in 98% of encounters. After adjusting for potential confounders, including patient characteristics and supervising attending, being in the primary care track was associated with lower odds (odds ratio [OR], 0.38; $P = .02$; 95% confidence interval [CI], 0.16–0.86), and graduating from a medical school with an above-average hospital care intensity index was associated with higher odds of prescribing brand name statins (OR, 1.70; $P = .049$; 95% CI, 1.003–2.88).

Conclusions We found considerable variation in brand name statin prescribing by residents. Medical school attended and residency program type were associated with resident prescribing behavior. Future interventions should raise awareness of these patterns in an effort to teach high-value, cost-conscious care to all residents.

Introduction

Health care costs in the United States were \$2.6 trillion in 2010 and are predicted to rise to \$4.6 trillion by 2020.¹ As a

result, there have been calls to incorporate cost awareness into graduate medical education.^{2,3} Past efforts to teach residents about costs focused mainly on the inpatient setting,⁴ and we know relatively little about factors driving resource utilization in residency.^{5,6} The limited information available about the drivers of resident ordering behavior may be 1 reason why educational interventions to improve cost-effective care among residents have not been successful.^{7,8}

To better understand physician resource utilization patterns as they develop during medical training, we decided to focus on 1 of the "Top 5" practices that may be overused in internal medicine. The Top 5 list for internal medicine was developed in 2011 by the National Physician Alliance.⁹ This initiative later morphed into the American Board of Internal Medicine's Choosing Wisely campaign.¹⁰ The Top 5 list for internists included a recommendation to use generic statins rather than brand name statins when initiating lipid-lowering therapy.^{11,12} In 2009, brand name statin prescribing was estimated to account for \$5.8 billion in annual costs.¹³

This study was designed to address 2 questions: (1) Was there variation in brand name versus generic statin

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prescribing when initiating cholesterol-lowering therapy by residents in an urban academic medical center? and (2) What resident characteristics were associated with higher rates of brand name statin prescribing?

Methods

We performed a retrospective, cross-sectional analysis of statin prescribing by internal medicine residents at Weill Cornell Internal Medicine Associates—the resident and attending practice of the New York Presbyterian/Weill Cornell internal medicine residency program. We obtained data from the practice's electronic health record for all patient encounters between July 1, 2010, and June 30, 2011 (including office visits, telephone encounters, and order-only encounters), where a statin was prescribed for a patient not previously receiving statin therapy. We selected this time interval because it predated generic availability of atorvastatin; therefore, all prescriptions for atorvastatin and rosuvastatin were for brand name Lipitor and Crestor, respectively. The study period also predated the US Food and Drug Administration's announcement about increased risk of muscle injury with high-dose simvastatin in June 2011.

Because we were interested in residents' initial choice of statin, we only included encounters in which the resident initiated statin therapy for a patient who was already established in the practice (for any indication). We excluded encounters in which the statin was refilled because this may not have reflected resident's choice of medication. We also excluded encounters for new patients because we were unable to distinguish whether the patient came to that visit already taking a statin (started by a previous doctor), with the resident just continuing the prior medication, or whether the resident initiated new statin therapy for the patient. Prescriptions that were later changed or discontinued (eg, if the patient or insurance company requested a change) were included in the analysis because our aim was to study initial prescribing behavior by the resident rather than the final statin obtained by the patient.

Our main outcome variable was percentage of brand name statin prescriptions (atorvastatin and rosuvastatin) for encounters with an established patient who received new statin therapy.

The independent variables were resident characteristics: postgraduate year (PGY), sex, program track (primary care or categorical), whether the resident was the patient's primary care provider, and the hospital care intensity (HCI) index. Residents in the primary care track rotated through the same inpatient rotations in PGY-1, but spent approximately 50% more time in the ambulatory practice in the

What was known

There are calls to enhance residents' awareness of the cost implications of their therapeutic decisions.

What is new

A study assessed factors at the resident and encounter level that resulted in residents prescribing generic rather than brand name statins for lipid-lowering therapy.

Limitations

Small sample, single institution study, and cross-sectional design reduce the ability to generalize.

Bottom line

Medical school graduation origin and being in the primary care versus categorical track had an impact on statin-prescribing practices.

last 2 years of training than categorical residents. In addition to increased ambulatory care time, primary care track residents were exposed to a comprehensive educational curriculum focusing on ambulatory medicine, including syllabus readings, case-based sessions, and clinical electives (eg, dermatology, musculoskeletal, women's health). No lectures during the study period focused specifically on generic prescribing or health care costs, and the clinic had no existing policy regarding generic medication prescribing.

The HCI is a measure of a health care utilization environment at an academic medical center and was used as a proxy of health care resource utilization intensity level in medical school. The HCI index was developed by the Dartmouth Atlas group¹⁴ as a composite of hospital days and inpatient physician visits in the last 2 years of life, using Medicare data. Across the United States, the HCI ranged from 0.6 (low intensity) to 2.1 (high intensity).¹⁴

We controlled for the following patient characteristics: age, sex, insurance (Medicare, Medicaid, and private/commercial insurance), and patient comorbidities (coronary artery disease, diabetes, cerebrovascular accident, and tobacco use).

The Weill Cornell Medical College Institutional Review Board reviewed and approved this study.

We performed 2 analyses: 1 at the resident level and 1 at the encounter level. For the resident-level analysis, the χ^2 and Fisher exact tests were used to test for associations between resident characteristics and the quintile of proportion of brand name statin prescriptions. For the encounter-level analysis, multivariable logistic regression with clustering at the resident level was used to control for other potentially confounding variables, including the patient and resident characteristics listed above and a

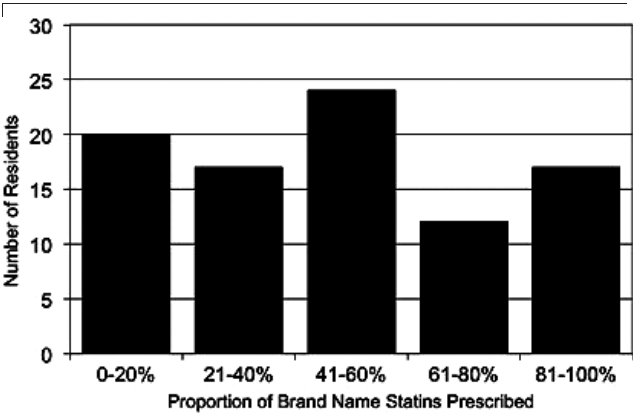


FIGURE **VARIATION IN GENERIC VERSUS BRAND NAME STATIN PRESCRIBING AMONG RESIDENTS**

This histogram shows the distribution of residents by quintile of brand name statin prescribing. The x-axis represents proportion of statin prescriptions that were written for brand name statins. The y-axis depicts the number of residents in each quintile.

dummy variable for each attending to control for the effect of supervising attending. The dependent variable in the regression analysis was whether a brand name versus generic statin was prescribed for the patient.

A *P* value of < .05 was considered significant. All analyses were performed by using Stata version 11 (StataCorp LP).

Results

During the study interval, residents prescribed a statin for 1565 patient encounters. We excluded 1246 encounters because they were for a refill (81%), or the patient was new to the practice (19%), for a final sample of 319 unique patient encounters with 90 residents (70% of residents in

the program) where statin therapy was initiated for an established patient.

Of the 90 residents in the sample, 37% (33 of 90) were PGY-1s; 33% (30 of 90) were PGY-2s; and 30% (27 of 90) were PGY-3s. Primary care track residents made up 11% (10 of 90) of the sample. Average HCl index for medical school residents had attended was 1.1, slightly higher than the national average (1.0).¹³ At the patient level, 64% (205 of 319) of patients in the sample were women, the mean age was 59.6 years (SD, 12.7 years), and most patients had publicly funded health insurance (40% [128 of 319] Medicare, 38% [122 of 319] Medicaid, and 22% [69 of 319] private/commercial insurance). Approximately a third of the patients had diabetes (34%, 109 of 319); 10% (32 of 319) had coronary artery disease; 2% (7 of 319) had a history of cerebrovascular accident; and 6% (18 of 319) were smokers.

The mean number of statin prescriptions written by each resident during the study period was 3.5 (SD, 0.2). Sixty-three percent of the residents wrote at least 3 statin prescriptions, and 16% (14 of 90) wrote more than 5 prescriptions during the study period. Brand name statins were prescribed in half (50%) of the encounters. We found considerable variation in brand versus generic statin prescribing among the residents (FIGURE). For example, 20 of 90 residents (22%) prescribed brand name statins in less than 20% of eligible encounters, whereas 17 of 90 residents (19%) prescribed brand name statins in greater than 80% of eligible encounters.

TABLE 1 presents resident characteristics by quintile of brand name statin prescribing. Thirty-six percent (12 of 33) of PGY-1 residents were in the lowest quintile of brand name prescribing, and we did not observe a trend toward more generic prescribing for more senior residents. Although most primary care residents (60%, 6 of 10) were

TABLE 1 RESIDENT CHARACTERISTICS BY LEVEL OF BRAND NAME STATIN PRESCRIBING						
Resident Characteristics	Proportion of Brand Name Statins Prescribed, No. (%)					P Value
	Lowest Quintile	Second Quintile	Middle Quintile	Fourth Quintile	Highest Quintile	
PGY-1	12 (36.4)	5 (15.2)	6 (18.2)	4 (12.1)	6 (18.2)	.10
PGY-2	1 (3.3)	8 (26.7)	5 (16.7)	10 (33.3)	6 (20.0)	
PGY-3	5 (18.5)	6 (22.2)	6 (22.2)	5 (18.5)	5 (18.5)	
Female	7 (17.1)	10 (24.4)	7 (17.1)	10 (24.4)	7 (17.1)	.87
Primary care track	3 (30.0)	3 (30.0)	2 (20.0)	1 (10.0)	1 (10.0)	.17
HCl index > 1.0	9 (14.3)	12 (19.1)	13 (20.6)	17 (27.0)	12 (19.1)	.11

Abbreviations: PGY, postgraduate year; HCl, hospital care intensity.

TABLE 2 FACTORS ASSOCIATED WITH BRAND NAME PRESCRIBING, CONTROLLING FOR ATTENDING EFFECT

	OR	P Value	95% Confidence Interval	
Patient Characteristics				
Patient comorbidities				
CAD	1.15	.76	0.47	2.81
DM	1.05	.86	0.63	1.75
CVA	0.57	.59	0.07	4.42
Smoker	0.66	.50	0.19	2.23
Patient sex (reference: male)	0.99	.98	0.59	1.69
Patient age	1.00	.99	0.98	1.03
Insurance (reference: private insurance)				
Medicare	0.60	.17	0.30	1.23
Medicaid	0.95	.87	0.50	1.79
Resident Characteristics				
Resident is the patient's PCP	0.55	.24	0.20	1.49
Year in training (reference: PGY-1)				
PGY-2	1.44	.41	0.61	3.41
PGY-3	1.17	.72	0.48	2.86
Primary care track	0.38	.02 ^a	0.16	0.86
Resident sex (reference: male)	0.95	.86	0.54	1.68
HCI index > 1.0	1.70	.049 ^a	1.003	2.88

Abbreviations: OR, odds ratio; CAD, coronary artery disease; DM, diabetes mellitus; CVA, cerebrovascular accident; PCP, primary care physician; PGY, postgraduate year; HCI, hospital care intensity.

^aStatistical significance at $P < .05$.

in the lowest 2 quintiles of brand name prescribing, this trend was not statistically significant ($P = .17$).

In the encounter-level analysis, after adjusting for patient characteristics, the supervising attending, and clustering at the resident level, we found that being in the primary care track was associated with lower odds of prescribing brand name statins (OR, 0.38; $P = .02$; 95% CI, 0.16–0.86; TABLE 2). Being exposed to a high HCI environment during medical school was associated with increased odds of prescribing brand name statins in residency (OR, 1.70; $P = .049$; 95% CI, 1.003–2.88).

Discussion

We found sizable variations in brand name versus generic statin prescribing by residents in an ambulatory academic practice. After controlling for attending and patient factors, more intensive health care utilization environment in medical school was positively associated with brand name

prescribing, and being in the primary care track was negatively associated with prescribing brand name statins.

We found no association between PGY in training and generic prescribing, suggesting that there was no consistent trend in prescribing patterns as residents progressed through training, which may imply that residents at all years of training could benefit from an intervention. Studies have shown residents welcome feedback regarding resource use relative to their peers.^{15,16} On the other hand, our findings suggest the possibility that factors early in medical training may play a role in prescribing behavior in residency. It also is not clear whether residents who tended to prescribe generics were more likely to match in the primary care track, or whether the primary care track experience influenced prescribing behavior.

Limitations of this study include a small sample size, a cross-sectional design, and the fact that we only studied a single academic practice reduces generalizability. We also were not able to control for other factors, such as patient

request for a brand name statin, which may have influenced resident prescribing.

Larger multicenter studies are needed to better evaluate the relationship between the training environment and physicians' practice styles, as well as the effect of supervising attending physicians and other factors.

Conclusion

Despite ongoing efforts to incorporate cost awareness into medical training, we found that marked variation in generic prescribing exists at the resident level. Our findings represent the first report of factors associated with prescribing of high-cost medications by residents in an ambulatory practice. The hypotheses generated by this study should be tested in future research. A better understanding of the factors that influence practice patterns may inform educational interventions to promote efficient resource utilization by residents, which may have lasting implications for their resource utilization in practice.

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