

Letters

RESEARCH LETTER

LESS IS MORE

Generic Medication Prescription Rates After Health System–Wide Redesign of Default Options Within the Electronic Health Record

The growing adoption of the electronic health record (EHR) brings new opportunities to improve physician decision making toward higher-value care.¹ Default options, or the conditions that are set into place unless an alternative is actively chosen, have been shown to influence decisions in many contexts.² However, the effectiveness of different



Editorial and Editor's Note



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ways of implementing defaults has not been systematically examined in health care, and many people may assume that changing defaults is a one size fits all intervention that will always have the same effect.² In prior work, changing the design of EHR medication display defaults for internal medicine physicians increased generic prescribing rates by 5.4 percentage points.³ In that intervention, the process of searching for a brand-name medication changed from displaying a list of brand-name options followed by their generic equivalents to displaying only generic-equivalent options. To view brand names, a physician had to click on another tab. In November 2014, the University of Pennsylvania Health System implemented a different change in EHR defaults among all specialties across the entire health system. Instead of changing EHR display defaults, an opt-out checkbox labeled “dispense as written” was

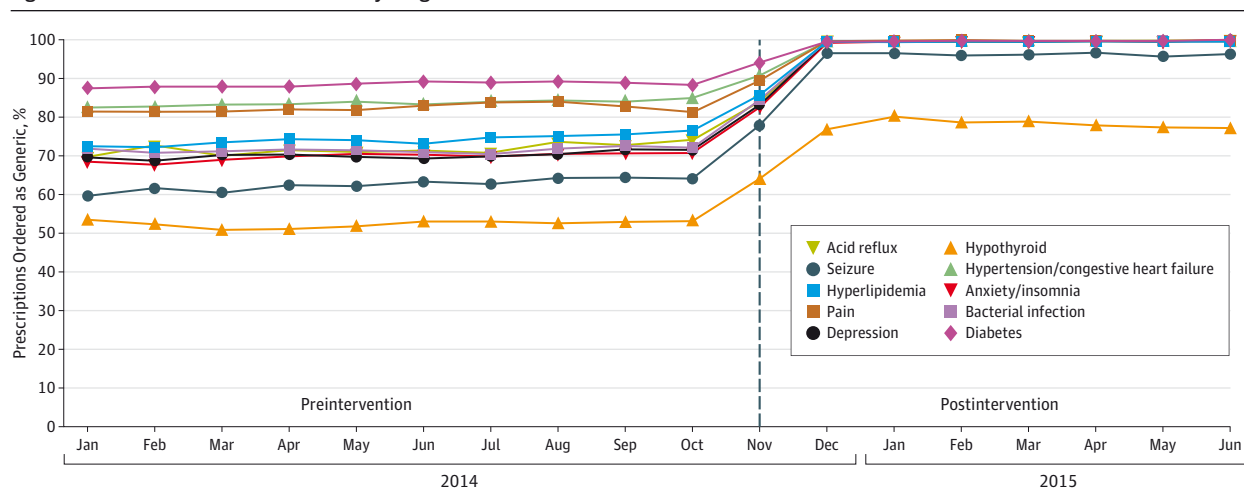
added to the prescription screen, and if left unchecked the generic-equivalent medication was prescribed. The objective of this study was to evaluate the effect of this intervention on physician prescribing behaviors.

Methods | Monthly prescription data from all University of Pennsylvania Health System outpatient clinics between January 2014 and June 2015 were obtained using Clarity, an EPIC reporting database. We included new prescriptions for oral medications often prescribed for 10 common medical conditions: acid reflux, anxiety and/or insomnia, bacterial infection, depression, diabetes, hyperlipidemia, hypertension and/or congestive heart failure, hypothyroid, pain, and seizure. Medications without an available generic-equivalent drug and combination pills were excluded. The University of Pennsylvania institutional review board deemed the study exempt.

Generic prescribing rates were compared between the preintervention period (January 2014 to October 2014) and the postintervention period (December 2014 to June 2015) using χ^2 tests. A difference-in-differences approach was used to test whether levothyroxine, a medication known to often have different levels of thyroid hormone than its brand-name formulation,⁴ had a different change in trend than other medications with similar baseline generic prescribing rates. Hypothesis tests were 2-sided with a significance level of $P < .05$. Analyses were conducted using Stata Version 12 (StataCorp).

Results | The overall generic prescribing rate increased significantly from 75.3% (611 068 of 811 561 prescriptions) during the 10-month preintervention period to 98.4% (644 587 of 655 011

Figure. Medications Prescribed as Generic by Drug Class and Month



Data presented are percent of medications prescribed as generic by month from January 2014 to June 2015 for each of the represented drug classes. The vertical gray line represents the intervention in mid-November.

Table. Levothyroxine Generic Prescribing Rate Over Time Relative to Medications With Comparable Baseline Rates

Medication	Generic, %			Adjusted Difference-in-Difference (95% CI) ^a	P Value
	Preintervention	Postintervention	Difference		
Atorvastatin	65.4	99.1	33.7		
Divalproex	37.4	90.6	53.2		
Levofloxacin	34.3	99.8	65.5		
Lamotrigine	45.2	91.4	46.2		
Levetiracetam	38.2	92.3	54.1	-15.6 (-16.4 to -14.8)	<.001
Zolpidem	64.7	98.8	34.1		
Overall ^b	57.6	98.2	40.6		
Levothyroxine	52.5	77.9	25.4		

^a Data represent linear probability regression model estimate for change in the trend of levothyroxine from the preintervention period to the postintervention period relative to the change in trend of all other medications (Overall) presented over the same time period.

^b Refers to the aggregate generic prescription rates for the medications listed above.

prescriptions) during the 7-month postintervention period ($P < .001$) (Figure). Compared with other medications with similar baseline generic prescribing rates, there was less of an increase for levothyroxine representing a greater proportion of opt-outs (adjusted difference-in-difference, -15.6 percentage points; 95% CI, -16.4 to -14.8; $P < .001$) (Table).

Discussion | Using generic medications has been associated with higher adherence and improved clinical outcomes.⁵ Yet, brand-name medications are often prescribed when generic equivalents exist, leading to unnecessary costs.⁶ The 23.1 percentage point generic prescribing rate increase in this study compares favorably with the 5.4 percentage point increase in prior work.³ The opt-out rate for generic levothyroxine was 22.1% after the intervention, compared with less than 2% among other medications, likely reflecting physician recognition that generic and brand-name levothyroxine may differ in formulation.⁴ This provides a real-world illustration of what has been a hypothesis in the health care context: that the effectiveness of defaults in changing behavior is appropriately mitigated in the setting of strongly held preferences.² Our results are limited to 1 health system and, in some settings, our intervention may be less effective than it appears because brand-name prescriptions are often converted to generics at pharmacies before dispensing. Nonetheless, our findings indicate that the manner that default options are designed and implemented has an important influence on their effectiveness for changing physician behavior.

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Drafting of the manuscript: Patel, Hanson, Martinez.

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- Patel MS, Volpp KG. Leveraging insights from behavioral economics to increase the value of health-care service provision. *J Gen Intern Med.* 2012;27(11):1544-1547.
- Halpern SD, Ubel PA, Asch DA. Harnessing the power of default options to improve health care. *N Engl J Med.* 2007;357(13):1340-1344.
- Patel MS, Day S, Small DS, et al. Using default options within the electronic health record to increase the prescribing of generic-equivalent medications: a quasi-experimental study. *Ann Intern Med.* 2014;161(10)(suppl):S44-S52.
- Hennessey JV. Generic vs name brand L-thyroxine products: interchangeable or still not? *J Clin Endocrinol Metab.* 2013;98(2):511-514.
- Gagne JJ, Choudhry NK, Kesselheim AS, et al. Comparative effectiveness of generic and brand-name statins on patient outcomes: a cohort study. *Ann Intern Med.* 2014;161(6):400-407.
- Gellad WF, Donohue JM, Zhao X, et al. Brand-name prescription drug use among Veterans Affairs and Medicare Part D patients with diabetes: a national cohort comparison. *Ann Intern Med.* 2013;159(2):105-114.