Published in final edited form as:

J Pharm Health Serv Res. 2012 March 1; 3(1): 11–16. doi:10.1111/j.1759-8893.2011.00068.x.

Is Customization in Antidepressant Prescribing Associated with Acute-Phase Treatment Adherence?

Elizabeth L. Merrick, Ph.D., MSW¹, Dominic Hodgkin, PhD¹, Lee Panas, MS¹, Stephen B. Soumerai, Sc.D.², and Grant Ritter, Ph.D.¹

Dominic Hodgkin: hodgkin@brandeis.edu; Lee Panas: lpanas@brandeis.edu; Stephen B. Soumerai: ssoumerai@hms.harvard.edu; Grant Ritter: ritter@brandeis.edu

¹Heller School for Social Policy and Management, Brandeis University, Waltham, MA

²Harvard Medical School and Harvard Pilgrim Health Care Institute, Boston, MA

Abstract

Objectives—The objective was to explore whether prescribing variation is associated with duration of antidepressant use during the acute phase of treatment. Improving quality of care and increasing the extent to which treatment is patient-centered and customized are interrelated goals. Prescribing variation may be considered a marker of customization, and could be associated with better antidepressant treatment adherence.

Methods—A cross-sectional secondary data analysis examining the association between providers' antidepressant prescribing variation and patient continuity of antidepressant treatment. The data source was two states' Medicaid claims for dual-eligible Medicaid/Medicare patients. The sample included 383 patients with new episodes of antidepressant treatment, representing 70 providers with at least four patients in the sample. We tested two alternate measures of prescribing concentration: 1) share of prescriber's initial antidepressant prescribing accounted for by the two most common regimens, and 2) Herfindahl index. The HEDIS performance measure of effective acute-phase treatment (at least 84 out of 114 days with antidepressant) was the dependent variable.

Key Findings—In multivariate analyses, the concentration measure based on the top two regimens was significant and inversely related to duration adequacy ($p < .05$). The Herfindahl index measure showed a trend towards a similar inverse relationship ($p < .10$).

Conclusions—The findings provide some support for the hypothesized relationship between prescribing variation and adequate antidepressant treatment duration during the acute phase of treatment. Future work with more detailed, clinical longitudinal data could extend this inquiry to better understand the causal mechanisms using a more direct measure of customized care.

Corresponding author: Elizabeth L. Merrick, PhD, MSW, Senior Scientist, Institute for Behavioral Health, Heller School for Social Policy and Management, Brandeis University, 415 South St., Mailstop 035, Waltham, MA 02454-9110. merrick@brandeis.edu Phone: 781-736-3917; Fax: 781-736-3985.

Elizabeth L. Merrick, Ph.D., M.S.W. Senior Scientist, Institute for Behavioral Health, Heller School for Social Policy and Management, Brandeis University, 415 South Street, MS035, Waltham, MA 02454-9110, Phone – (781) 736-3917, Fax – (781) 736-3985

Dominic Hodgkin, Ph.D. Associate Professor, Institute for Behavioral Health, Heller School for Social Policy and Management, Brandeis University, 415 South Street, MS035, Waltham, MA 02454-9110, Phone – (781) 736-8551, Fax – (781) 736-3985

Lee Panas, M.S. Statistical Analyst/Programmer, Institute for Behavioral Health, Heller School for Social Policy and Management, Brandeis University, 415 South Street, MS035, Waltham, MA 02454-9110, Phone – (781) 736-3943, Fax – (781) 736-3985

Stephen B. Soumerai, Sc.D. Professor of Population Medicine, Director of the Drug Policy Research Group, Harvard Medical School and Harvard Pilgrim Health Care Institute, 133 Brookline Avenue, 6th Floor, Boston, MA 02215, Phone – 617-509-9942, Fax – 617-859-8112

Grant Ritter, Ph.D. Senior Scientist, Institute for Behavioral Health, Heller School for Social Policy and Management, Brandeis University, 415 South Street, MS035, Waltham, MA 02454-9110, Phone – (781) 736-3872, Fax – (781) 736-3985

Keywords

antidepressants; prescribing patterns; quality of care; depression treatment; customization

Introduction

Improving quality of care and increasing the extent to which treatment is patient-centered and customized are interrelated goals in health care, including mental health services.¹ Depression is highly prevalent and frequently treated with antidepressants. Yet, treatment of depression with antidepressant medications is frequently suboptimal in ways that can undermine effectiveness.^{2,3} In this paper, we report on an analysis of whether prescribing variation, considered as a marker of customization, may be associated with antidepressant treatment continuity during the acute phase of treatment.

Practice guidelines for depression treatment, including from the American Psychiatric Association, indicate that when antidepressant treatment is initiated it should occur throughout the acute phase of treatment (often operationalized in research as the first three months after initial depression diagnosis) and then extend a minimum of 4 to 9 months beyond that.^{4,5} The National Committee for Quality Assurance's (NCQA) HEDIS performance measurement set includes an antidepressant medication management measure. HEDIS measures are widely used by health plans and other organizations in the U.S. for accreditation, accountability and quality improvement purposes, as well as in research⁶. The depression measure includes a component focused on effective acute-phase treatment of depression. This is defined as the percentage of newly diagnosed and treated plan members who remained on an antidepressant medication for at least 84 days (12 weeks). In 2009, only 49.6% of such patients in Medicaid health maintenance organizations reporting to NCQA continued on antidepressants for this length of time.⁶ Many studies have found extensive early discontinuation in the acute phase, with adherence in a variety of settings ranging from 40%-61%.⁷⁻⁹

Related to improving the effectiveness and quality of care, there is an increasing focus on personalized or customized treatment. For example, the National Institute for Mental Health has called for more research on personalized care. This often refers to research into which medications work best for whom, under ideal conditions.¹⁰ This is likely to be useful to the extent that providers are able and willing to customize treatment in day-to-day practice. In the context of antidepressant treatment, the concept of personalized care includes careful selection and adjustment of medications in response to each patient's characteristics and preferences. The efficacy of many first-line antidepressants including selective serotonin reuptake inhibitors (SSRIs) and serotonin-norepinephrine reuptake inhibitors (SNRIs) is, on average, similar but difficult to predict on an individual basis—thus creating a trial-and-error aspect to the process. However, there are factors such as adverse effect profiles and patient preferences that should guide selection of an initial medication for a particular patient.¹¹ Patient treatment history (e.g., restarting medication that has worked in the past), type of depressive symptoms and the side effect profile of the medication (e.g., avoidance of more sedating antidepressants for patients who have problems with psychomotor retardation and excessive sleep), and preferences or concerns of the patient (e.g., wishing to minimize risk of sexual side effects) are all possible factors to be taken into account in customized prescribing.

Thus, customization implies some degree of selecting different antidepressants for different patients. Examining a prescriber's practice patterns, one would expect to see substantial variation in prescribing across their patients. Alternatively, physicians may rely on rules of

thumb or norms.¹² Physicians may use “ready-to-wear” (norms-based) versus “custom-made” treatment due to the costs involved in customizing care (e.g., time and effort involved in tailored decision-making and communication with patients).¹³ In relation to antidepressant prescribing specifically, one study found evidence that physicians tended to follow norms-based behavior in a way that was not consistent with optimal treatment.¹³ Another study examining concentration of prescribing antipsychotic drugs found that prescribing behavior was quite concentrated and that prescribing concentration varied by provided factors such as provider training and volume of patients.¹⁴

The relationship between customization in antidepressant prescribing and medication adherence has not yet been explored. Greater customization could be related to sufficient acute-phase treatment duration due to better adherence when problematic side effects are minimized and likelihood of helping is maximized by attending to patient needs, history and preferences. To examine this relationship directly would require extensive clinical data in order to evaluate. However, customization implies greater prescribing variation. In this exploratory work, we examined alternate measures to operationalize the customization concept using administrative data. We explored the relationship of two customization markers (alternate measures of prescribing concentration) —with antidepressant treatment adherence during the acute phase. The first measure reflects the share of prescribing accounted for by the two most common regimens, and the second is a Herfindahl index (detailed below in “Methods”). We hypothesized that lower concentration (i.e. greater customization) would be associated with better treatment adherence.

Methods

Data and sample

The data source was four years of Medicaid claims for prescription drugs and medical services from Michigan and Indiana (2000 to 2003). The sample consisted of continuously enrolled, dual Medicare-Medicaid enrollees aged 18 or older with a qualifying new episode of antidepressant treatment during the period. The dual-eligible population, which includes low-income older adults and younger disabled persons, typically has high rates of mental health need.¹⁵ We based our sample selection criteria on a modified version of the National Committee for Quality Assurance's HEDIS antidepressant medication management measures.¹⁶ New episodes of treatment were identified based on qualifying depression diagnosis code (ICD9-CM codes 296.20-296.25, 296.30-296.35, 298.0, 300.4, 309.1, 311; note bipolar disorder is excluded) and antidepressant prescription after an absence of depression diagnosis for the previous 120 days plus an absence of antidepressant prescriptions for the previous 90 days. The index prescription was defined as occurring within 30 days before or after qualifying diagnosis. We extended the HEDIS specification of 14 days after diagnosis due to concerns that in practice, patients may not fill a prescription that quickly but may still do so within a reasonable period of time. We selected only the first qualifying episode per patient. We selected episodes for which there was a single prescriber of antidepressants during the episode observation window extending 114 days after the index prescription start date, in order to be certain of prescribing pattern attribution. This resulted in identifying 3,460 patients of 2,617 providers. We then further selected only those patients whose prescribers were considered relatively high-volume, defined as having at least four patients in the sample with a qualifying depression diagnosis who were treated with antidepressants during the period. This follows prior research examining prescribing variation in other medical disorders.¹³ There were 70 high-volume providers with 383 qualifying patient episodes used in this analysis.

Measures

Duration adequacy—This was defined as having filled antidepressant prescriptions covering at least 84 days during the 114-day post-index observation period. We used the HEDIS acute-phase antidepressant medication management measure specifications¹⁶ with the modification described earlier (allowing 30 days post-index visit for a qualifying prescription to be filled).

Concentration measures—The first concentration measure (Conc-Top 2) represents the share of the prescriber's initial antidepressant prescribing (across all of their patients with qualifying episodes in the data set) accounted for by the two most commonly used initial regimens. This is a variation on a general approach used in previous research, e.g., Frank and Zeckhauser's use of a concentration measure based on share of single most common medication prescribed for a given condition.¹³ We defined an initial regimen as the specific antidepressant or combination of antidepressants for which prescriptions were filled within 7 days of the index prescription start date. Generic and brand versions of the same drug were considered the same. A lower Conc-Top 2 score indicates a higher degree of variation.

The second concentration measure (Conc-Herfindahl) was calculated as a Herfindahl index, which squares each regimen's share of the prescriber's portfolio and then sums the squared shares. This index is widely used in economic studies, and has also previously been used specifically to characterize physicians' medication prescribing.¹⁷⁻¹⁹ A lower Conc-Herfindahl score indicates a higher degree of variation, and greater equality in regimens' shares.

Covariates

We included covariates related to patient, treatment, and provider characteristics found previously to be associated with treatment adequacy or duration.^{2,3,7,8,20,21} Patient characteristics included sex, age category, and race (collapsed into a dummy variable “white” for multivariate models due to the fact that the large majority of nonwhites were black). We also included variables indicating whether there was a primary diagnosis of major depression during the episode; overall comorbidity using the Deyo-modified Charlson Comorbidity Index (categorized into scores of 2 versus 0-1, with higher scores indicating greater comorbidity)²²; and whether there was any non-depression behavioral health diagnosis during the episode (behavioral health comorbidity).

Treatment characteristics measured and used in bivariate comparisons include whether the initial regimen prescribed included an SSRI (versus other regimens, primarily other novel antidepressants such as SNRIs with or without older medications such as tricyclics), and for descriptive purposes the number of different antidepressants used during the episode as well as number of days during the observation period with any antidepressant. In multivariate models, we included the variable indicating whether an initial regimen included SSRI.

The key provider-related characteristics were two different concentration scores. We did not have data directly indicating specialty. We developed an approach to attributing specialty as psychiatric versus general medical prescribers based on an examination of each prescriber's total psychotropic and nonpsychotropic prescribing. When we examined the proportion of all prescribing accounted for by several major categories of psychotropics (antidepressants, anxiolytics, antipsychotics) we found a clear bimodal distribution. Among the 70 high-volume providers, 55 providers had a proportion of .26 or less, and the remainder had a proportion of .71 or greater. The former were categorized as general medical providers and the latter were categorized as specialists in psychiatry. We also constructed a variable for number of patients in sample per provider but did not include it as a covariate in final

models due to substantial correlation with both concentration measures (-.47). However, we tested its inclusion and conducted other sensitivity analyses to ascertain effects on our key explanatory variables, and we report those results. We also controlled for the patient's state of residence.

Statistical Analysis

Descriptive statistics are presented. Chi-square and t-tests were used to test bivariate associations between patient, treatment and provider characteristics and treatment adequacy measures. We used generalized estimating equations with a logit link for multivariate models examining independent effects of patient, treatment and provider characteristics on whether each adequacy standard was met. This approach addressed the clustering of patients within providers. All analyses were implemented using Stata Statistical Software Release 11.²³ There were two multivariate models, one for each concentration measure.

Results

Sample description

Women accounted for most (72.1%) of the sample (Table 1). The large majority of patients were 45 years of age or older. About three quarters of the patients were white, with nearly all of the remainder being black. Just over half of the patients had a primary diagnosis of major depression at some point during the treatment episode. All patients had a Charlson comorbidity index score between 0 and 2. Nearly half (47.0%) had a non-depression behavioral health diagnosis on claims during the treatment episode. Initial regimens including an SSRI accounted for 66.3% of episodes. The large majority of the other initial regimens contained other novel antidepressants such as SNRIs; overall only 3.9% used tricyclics alone (data not shown). Only 15.1% of patients received more than one specific antidepressant during the acute phase episode, and the mean number of days with any antidepressant was about 68. Fewer than half (40.0%) met duration adequacy criteria.

The 70 high-volume providers included in this analysis had a mean Conc-Top 2 score of 0.7 (standard deviation [SD] 0.2), indicating that on average, the top two regimens accounted for 70% of a prescriber's antidepressant treatment regimens. The mean Conc-Herfindahl score was 0.3 (SD 0.1). Both measures are consistent with a substantial degree of concentration. Most prescribers (78.6%) were general medical prescribers. The mean number of patients each provider treated in the sample was 5.5 (SD 3.0).

Bivariate relationships with adequate treatment duration

Table 2 displays duration adequacy results by patient or treatment characteristics. Factors significantly associated on a bivariate basis with meeting duration adequacy criteria included being white, age 75 or older, and having an initial regimen that included an SSRI. A significantly lower proportion of patients aged less than 45 had treatment that met duration adequacy criteria. Conc-Top 2 and Conc-Herfindahl variables were not significantly associated with duration adequacy. The mean number of days with any antidepressant was significantly higher among those who achieved duration adequacy (approximately 105 days versus 44 days).

Multivariate results

In our first model, Conc-Top 2 was significant and inversely related to duration adequacy ($p < .05$). Covariates that were positively associated with duration adequacy included age 60-74 (OR 2.4, CI = 1.2, 4.8, $p < .05$) and age 75 or older (OR 2.7, CI = 1.4, 5.4, $p < .01$) compared to age less than 45, and being white (OR 2.4, CI = 1.3-4.3, $p < .01$). Having an SSRI as part of the initial regimen was also positively associated with duration adequacy (OR 1.7, CI =

1.0-2.8, $p < .05$). In the second model, Conc-Herfindahl was marginally significant ($p < .10$) in the same direction as Conc-Top 2. Results for other covariates were similar to those seen in the first model.

We conducted sensitivity analyses to better determine the impact of the two concentration measures, given their correlation with providers' number of patients in the sample. First, we included a variable for number of patients in the model, and found that it was not significant in predicting adequacy of treatment duration, nor did it qualitatively affect the key results. Second, we restricted the sample of providers to those who had either four or five patients in the sample, in order to limit any potential impact of patients per provider. Results were similar to our main models presented here, but the concentration variables were more highly significant.

Discussion

In this exploratory study, we found some evidence for the hypothesized inverse relationship between prescribing concentration and antidepressant treatment duration in the acute phase, i.e. lower prescribing concentration (higher variation) was associated with greater likelihood of antidepressant treatment continuity. This is a new contribution to the body of research focusing on individualized or customized care. Prior work has focused on patterns and predictors of prescribing concentration,^{13,14} but has not specifically examined the relationship with adherence.

The current exploratory findings indicate it would be worthwhile to delve further into causal mechanisms using more detailed clinical data. The relationship between these hypothesized markers of customization and duration of treatment seems likely to operate at least partly through the mechanism of patient adherence to recommended care. Patients may be more likely to continue their medication when the initial regimen takes into account the specifics of their clinical picture and their preferences. This customizing may reduce drop-out due to minimized side effects or increased effectiveness resulting from optimized treatment matching.

It may also be that providers who customize care are also more likely to be skilled at assessment, engaging patients, and other aspects of care. These are areas that could be investigated in future research with more detailed data on clinical care and provider skill level. Although not the primary focus of this study, the results for certain covariates are of interest. For example, white patients had a significantly higher likelihood of treatment duration adequacy. This supports some previous findings regarding differences in adequacy of treatment by race^{8,24} although evidence on this point is mixed,^{21,25} and adequacy has been measured in a variety of ways.

Limitations of the study include potentially limited generalizability in that our sample consisted of dual-eligible Medicare/Medicaid patients. Also, as noted earlier, the number of patients per provider in the sample was correlated with the concentration and diversification measures. However, sensitivity analyses indicated that our main findings remained qualitatively similar when we dealt with that issue in several ways. Our method of attributing prescriber specialty is new, to the best of our knowledge, and it would be important to validate this in future work when necessary data are available. Although we controlled for comorbidity and type of depression diagnosis (major depressive disorder versus other), we did not have data to control for depression severity within diagnostic category. If unobserved depression severity was associated with customization and outcomes, that could result in confounding. The cross-sectional design of the study identifies associations but does not allow for a determination of causality. Our key explanatory

variables do not directly measure customization of care, but rather are considered markers or prerequisites implied by the customization concept. Future work with more detailed clinical data would enable further, more direct inquiry into the impact of customization on treatment quality as well as the relationship between these indicators and more direct measures. Finally, larger sample sizes with more provider variables would also facilitate important extensions of this work, with greater statistical power.

Conclusion

In summary, our exploratory findings provide initial support for the hypothesized relationship between prescribing variation and antidepressant treatment adequacy, specifically in regard to acute-phase treatment continuity. These findings have implications for better understanding of both how to identify customization in prescribing and what its impact may be on antidepressant treatment adherence, a major clinical issue. The current study provides intriguing preliminary evidence, but also has limitations including lack of detail regarding prescribers. Given the increased focus on customized mental health care, further work in this area is indicated.

Acknowledgments

This study was funded by the National Institute of Mental Health grant # R01 MH77727. The data were provided through grant numbers 5U18HS016955-04 from the Agency for Health Care Research and Quality (AHRQ) and 5R01MH069776-03 from the National Institute for Mental Health. The authors thank Amy Johnson and Dan Gilden for assistance with the data, and Michele Hutcheon for manuscript preparation. Dr. Soumerai is a senior investigator in the AHRQ HMO Research Network Center for Education and Research in Therapeutics.

References

1. Institute of Medicine. Improving the Quality of Health Care for Mental and Substance-Use Conditions. Washington, DC: National Academies Press; 2006.
2. Donaghue J, Taylor DM. Suboptimal use of antidepressants in the treatment of depression. *CNS Drugs*. 2000; 13(5):365–383.
3. Weilburg JB, et al. Evaluation of the adequacy of outpatient antidepressant treatment. *Psychiatr Serv*. Sep; 2003 54(9):1233–1239. [PubMed: 12954939]
4. Agency for Health Care Policy and Research. Treatment of major depression, Clinical Practice Guideline. Vol. 2. Rockville, MD: U S Department of Health and Human Services, Public Health Service, Agency for Health Care Policy and Research; 1993. Depression Guideline Panel.
5. American Psychiatric Association. Treatment of patients with major depressive disorder. Third Nov. 2010 http://www.psychiatryonline.com/pracGuideChapTOC_7.aspx.
6. National Committee for Quality Assurance (NCQA). State of Health Care Quality. Washington, DC: NCQA; 2010. p. 2010
7. Akincigil A, et al. Adherence to antidepressant treatment among privately insured patients diagnosed with depression. *Med Care*. Apr; 2007 45(4):363–369. [PubMed: 17496721]
8. Charbonneau A, et al. Measuring the quality of depression care in a large integrated health system. *Med Care*. May; 2003 41(5):669–680. [PubMed: 12719691]
9. Lingam R, Scott J. Treatment non-adherence in affective disorders. *Acta Psychiatr Scand*. Mar; 2002 105(3):164–172. [PubMed: 11939969]
10. Insel T. Translating scientific opportunity into public health impact: A strategic plan for research on mental illness. *Arch Gen Psychiatry*. 2009; 66(2):128–133. [PubMed: 19188534]
11. Qaseem A, et al. Using second-generation antidepressants to treat depressive disorders: a clinical practice guideline from the American College of Physicians. *Ann Intern Med*. Nov 18; 2008 149(10):725–733. [PubMed: 19017591]
12. Smoller JW, Nierenberg AA. Small numbers, big impact. *Harv Rev Psychiatry*. Jul-Aug;1999 7(2): 109–113. [PubMed: 10471249]

13. Frank RG, Zeckhauser RJ. Custom-made versus ready-to-wear treatments: behavioral propensities in physicians' choices. *J Health Econ.* Dec 1; 2007 26(6):1101–1127. [PubMed: 18031852]
14. Taub, AAL., et al. The Diversity of Concentrated Prescribing Behavior: An Application to Antipsychotics. Working Paper 168231; Feb. 2011 NBER Working Paper Series: Working Paper 168231<http://www.nber.org/papers/w16823>,.
15. Kaiser Family Foundation. Dual Eligibles: Medicaid's Role for Low-Income Medicare Beneficiaries. Nov. 2010 www.kff.org/medicaid/upload/4091-07.pdf.
16. National Committee for Quality Assurance (NCQA). HEDIS 2009 Technical Specifications. 2008; 2
17. Coscelli A, Shum M. An empirical model of learning and patient spillovers in new drug entry. *Journal of Econometrics.* 2004; 122(2):213–246.
18. De Jong JD, et al. Do decision support systems influence variation in prescription? *BMC Health Serv Res.* 2009; 9:20. [PubMed: 19183464]
19. Stern, S.; Trajtenberg, M. Empirical Implications of Physician Authority in Pharmaceutical Decisionmaking. Working Paper No. 6851; National Bureau of Economic Research; 1998.
20. Olfson M, et al. Continuity of antidepressant treatment for adults with depression in the United States. *Am J Psychiatry.* Jan; 2006 163(1):101–108. [PubMed: 16390896]
21. Rollman BL, et al. Race, quality of depression care, and recovery from major depression in a primary care setting. *Gen Hosp Psychiatry.* Nov-Dec;2002 24(6):381–390. [PubMed: 12490339]
22. Deyo RA, et al. Adapting a clinical comorbidity index for use with ICD-9-CM administrative databases. *J Clin Epidemiol.* Jun; 1992 45(6):613–619. [PubMed: 1607900]
23. StataCorp. Stata Statistical Software: Release 11. College Station, Texas: StataCorp LP; 2009.
24. Busch SH, et al. Measuring quality of pharmacotherapy for depression in a national health care system. *Med Care.* Jun; 2004 42(6):532–542. [PubMed: 15167321]
25. Joo JH, et al. Predictors of adequacy of depression management in the primary care setting. *Psychiatr Serv.* Dec; 2005 56(12):1524–1528. [PubMed: 16339613]

Table 1
Sample Description: Patients, Treatment Episodes and Providers

	N	Percent
Patient characteristics (N= 383)		
Female	276	72.1
Age:		
18-44	81	21.2
45-59	80	20.9
60-74	107	27.9
75+	115	30.0
Race:		
White	291	76.0
Black/African American	84	21.9
Other	8	2.1
Primary diagnosis of major depression in episode	200	52.2
Charlson comorbidity index score: (higher= greater comorbidity)		
0	85	22.2
1	82	21.4
2	216	56.4
Behavioral health comorbidity	180	47.0
Treatment episode characteristics (N = 383)		
Initial regimen includes SSRI	254	66.3
More than one specific antidepressant used in episode	58	15.1
Number of days with any antidepressants (mean/SD)	383	68.2 (33.6)
Meets duration adequacy criteria	153	40.0
Provider characteristics (N= 70)		
Conc-Top 2 score (mean, SD)	70	0.7 (0.2); Range = 0.4-1.0
Conc-Herfindahl score (mean, SD)	70	0.3(0.1) Range = 0.1-1.0
General medical prescriber	55	78.6
Number of patients in sample (mean, SD)	70	5.5 (3.0); Range = 4.0-20.0

Table 2
Duration Adequacy by Patient, Treatment and Provider Characteristics

Characteristics	Meets duration adequacy criteria (percent)
Total	40.0
Gender:	*
Female	42.8
Male	32.7
Age:	
<45	22.2***
45-59	36.3
60-74	44.9
75 +	50.4***
Race:	***
White	44.7
Non-white	25.0
Any primary diagnosis of major depression during episode	41.0
No primary diagnosis of major depression	38.8
Charlson comorbidity score:	**
0-1	33.5
2	44.9
Behavioral health comorbidity	40.6
No behavioral health comorbidity	39.4
Initial regimen includes SSRI	43.7**
No SSRI	32.6
Number of different antidepressants in episode:	
1	39.4
2 or more	43.1
Number of days with any antidepressant: Mean (SD)	***
Adequate duration.	104.5 (0.8).
Not adequate duration	44.1 (1.2)
Prescriber's Conc-Top 2 score: Mean (SE)	
Adequate duration	0.62 (0.01)
Not adequate duration	0.64 (0.01)
Prescriber's Conc-Herfindahl score: Mean (SE)	
Adequate duration	0.30 (0.01)
Not adequate duration	0.32 (0.01)

Characteristics	Meets duration adequacy criteria (percent)
Prescriber is psychiatric specialist	32.3
General medical provider	41.4
Prescriber's number of patients treated with antidepressants: Mean, SE)	
Adequate duration	6.9 (0.3)
Not adequate duration	7.2 (0.3)

*
p <.10

**
p<.05

p <.01

Table 3
Determinants of Duration Adequacy Generalized Estimating Equations with Logit Link
(n= 383)

	Conc-Top 2 model		Conc-Herfindahl model	
	Coefficient (SE)	Odds ratio (95% CI)	Coefficient (SE)	Odds ratio (95% CI)
Intercept	-1.6 (0.7) **	----	-2.0 (0.6) ***	----
Conc-Top 2	-1.3 (0.7) **	----		----
Conc-Herfindahl	----	----	-1.5 (0.9) *	----
Female	0.3 (0.3)	1.4 (0.8-2.4)	0.3 (0.3)	1.4 (0.8-2.4)
Age: (ref= <45)				
45-59	0.6 (0.4)	1.8 (0.8-3.7)	0.6 (0.4)	1.7 (0.8-3.7)
60-74	0.9 (0.3) **	2.4 (1.2-4.8) **	0.9 (0.3) **	2.4 (1.2-4.7) **
75+	1.0 (0.3) ***	2.7 (1.4-5.4) ***	1.0 (0.3) ***	2.7 (1.4-5.4) ***
White	0.9 (0.3) ***	2.4 (1.3-4.3) ***	0.9 (0.3) ***	2.4 (1.3-4.3) ***
Primary diagnosis of major depression in episode	0.2 (0.2)	1.2 (0.8-1.8)	0.2 (0.2)	1.2 (0.8-1.8)
Charlson comorbidity score =2 (vs. 0-1)	0.4 (0.3)	1.4 (0.8-2.4)	0.3 (0.3)	1.4 (0.8-2.4)
Behavioral health comorbidity	-0.0 (0.2)	1.0 (0.6-1.5)	-0.1 (0.2)	0.9 (0.6-1.5)
Initial regimen includes SSRI	0.5 (0.3) **	1.7 (1.0-2.8) **	0.5 (0.3) **	1.7 (1.0-2.8) **
Psychiatric prescriber	-0.1 (0.4)	0.9 (0.4-2.0)	-0.1 (0.4)	0.9 (0.4-2.0)
State	-0.4 (0.3)	0.7 (0.4-1.1)	-0.4 (0.3)	0.7 (0.4-1.1)

*
p<.10

**
p <.05

p<.01