Guideline-Consistent Antidepressant Treatment Patterns Among Veterans With Diabetes and Major Depressive Disorder

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Objective: **This study estimated guideline-consistent antidepressant treatment of depression among veterans with diabetes and examined its variation by patient-level demographic characteristics, socioeconomic characteristics, access to care, and health status.** _Methods:_ **Data were retrospectively analyzed from Veterans Health Administration (VHA) and Medicare claims of VHA clinic users with diabetes and major depressive disorder (N=3,953). Major depression was identified by using _ICD-9-CM_ codes 296.2 and 296.3. Incident episode was identified by using 120-day negative diagnosis and medication history on or before the first depression diagnosis date in fiscal year 1999. Guideline-consistent depression treatment was defined as the receipt of antidepressants for at least 90 days within a period of six months after the onset of depression. Chi square tests and logistic regressions were used to analyze patterns of guideline-consistent antidepressant treatment.** _Results:_ **Overall, 51% received any antidepressant treatment for diagnosed major depression; among patients using any antidepressants, 62% received guideline-consistent antidepressant treatment. VHA users who received care from a mental health specialist were more likely to have guideline-consistent treatment than those who were not receiving care from a mental health specialist. African Americans, older veterans, and those with substance use disorders were less likely to have guideline-consistent antidepressant treatment.** _Conclusions:_ **Guideline-consistent depression care was lower for certain subgroups of individuals. Further research is necessary to evaluate the reasons for this finding, so that targeted care coordination strategies could be developed to improve antidepressant treatment. Increased contact with mental health specialty staff, which is now being implemented in the VHA, may increase antidepressant treatment among VHA users with diabetes and major depression. (_Psychiatric Services_ 59:1139–1147, 2008)**

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The prevalence of depression among persons with diabetes is very high and ranges from as low as 11%, when standardized diagnostic interviews are used, to as high as 31%, when assessed by questionnaires (1). Comorbid depression complicates diabetes care and adversely affects health care expenditures and clinical outcomes. Specifically, co-occurring depression as measured by using symptom scales or diagnostic criteria is associated with hyperglycemia (2), has been shown to lower adherence to oral hypoglycemic and lipid-lowering medications (3), and is associated with functional disability (4). Total health care expenditures of individuals with self-reported depression and diabetes are 4.5 times higher than those of individuals with diabetes without depression (5).

However, clinical trials have shown that pharmacologic treatments, specifically the new-generation antidepressants, and nonpharmacologic treatments for major depression tend to improve glycemic control (6,7). In a randomized double-blind placebo-controlled trial of patients with comorbid diabetes and depression, fluoxetine, as compared with a placebo, was associated with better glycemic control and reduced depressive symptoms (7).

Recent studies have documented cost advantages of treating depression among individuals with diabetes. A one-year cross-sectional observation-

al study found that antidepressant treatment was associated with increased adherence to cardiovascular medications among individuals with diabetes and cardiovascular conditions and found that adherent patients had lower medical charges (8). A randomized controlled trial of individuals with diabetes and depression that compared a systematic depression treatment program (beginning with either problem-solving psychotherapy or a structured antidepressant pharmacotherapy program) with care as usual found that systematic depression treatment significantly reduced the cost per patient (9).

However, much remains unknown about treatment patterns for depression among individuals with diabetes and depression. Only a handful of studies have examined depression treatment among patients with diabetes and depression. Some of these studies reported very low rates of depression treatment. Among Latinos with diabetes, less than one-half of the patients with moderate or severe depression identified from self-reported symptoms received mental health treatment (10). Using 1995 Medicaid data from four states, Sambamoorthi and colleagues (11) found that among Medicaid beneficiaries with diagnosed depression and diabetes, there were significant gender, racial and ethnic, and age variations in depression treatment. Using data from a single site of the Veterans Health Administration (VHA), Jones and colleagues (12,13) suggested that although diabetes did not affect depression care, antidepressant treatment duration fell short of guideline recommendations, with 11% receiving adequate duration of treatment. In another study, among individuals with diabetes and diagnosed depression, only one-third were adherent to antidepressant medications (8).

The added beneficial effects of depression treatment among individuals with diabetes in improving adherence to cardiovascular medications and lower medical charges can only be realized when depression treatment rates are high and there are no subgroup differences in depression treatment. Therefore, understanding the treatment patterns will be the first step toward identifying subgroup differences in treatment to help inform strategies for increasing treatment access and realizing cost-savings associated with depression treatment. Therefore, the primary objective of this article is to examine patterns of any antidepressant treatment and of guideline-consistent antidepressant treatment among patients with diabetes and diagnosed depression by using a merged nationwide VHA and Medicare database.

Methods
Data
We used the merged VHA and Medicare database of the Diabetes Epidemiology Cohort (DEpiC), a multiyear, dynamic cohort of individuals with diabetes who use the VHA for health care. Details of identification and construction of the cohort are described elsewhere (14). We used the cohort of VHA clinic users with diabetes who were identified between fiscal year (FY) 1998 and FY 1999. Patients enrolled in Medicare health maintenance organizations (HMOs) were not included in the cohort. This study was approved by the Veterans Affairs New Jersey Health Care System (VANJHCS) Institutional Review Board (a subcommittee of the VANJHCS Research and Development Committee) and the VANJHCS Research and Development Committee.

Identification of veterans with diabetes and major depression
We required a VHA clinic user with diabetes to have a face-to-face encounter with a clinician that resulted in a diagnosis of a major depressive disorder (15). Diagnosis of a major depressive disorder was based on the following *International Classification of Diseases 9th Clinical Modification* (*ICD-9-CM*) codes: 296.2 (major depressive disorder, single episode) and 296.3 (major depressive disorder, recurrent episode). We restricted our analysis to those with major depressive disorder because there are established guidelines for its pharmacological treatment (16). We identified 16,449 veterans who were VHA clinic users with diabetes and had at least one face-to-face encounter with a cli-

nician that resulted in a diagnosis of a major depressive disorder. In the rest of the article, unless otherwise specified, depression refers to diagnosed major depressive disorder.

Some individuals treated for depression during the period of available data may have had episodes of depression treatment that began before the start of our observation period (October 1, 1998). Therefore, we distinguished between prior episodes of depression and incident depression by using adapted criteria from the National Committee for Quality Assurance (NCQA)—that is, a 120-day (four-month) "negative diagnosis history" on or before the first observed depression diagnosis date and a 120-day (four-month) "negative medication history" on or before the first observed prescription date (17). On the basis of these criteria, we identified 3,953 VHA users with diabetes and an incident diagnosis of major depressive disorder between February 1, 1999, and September 30, 1999, using a four-month negative diagnosis and negative medication history between October 1, 1998, and January 30, 1999. These individuals were followed for six months (180 days) from the time of the incident depression diagnosis.

Dependent variables
Receipt of any antidepressant. Prescribed medications were obtained from pharmacy files, and antidepressant medications were identified through drug names. Among individuals with diabetes and incident depression, any individual with at least one prescription for antidepressant medications on or after the depression diagnosis date was considered to be receiving antidepressant treatment for depression. It should be noted that we evaluated only the filling of the prescription, not its actual use by the patient.

Guideline-consistent antidepressant treatment. We defined guideline-consistent antidepressant treatment of depression in terms of duration, because discontinuation in terms of duration has been associated with 30% to 50% of relapses (18). We did not assess dosage adequacy because prior work by VHA investiga-

Table 1

Description of 3,953 persons with diabetes and incident major depression who used the Veterans Health Administration (VHA) for health care, fiscal year 1999[a]

Variable	N	%	Variable	N	%
Gender			Anxiety		
Women	146	3.7	Yes	807	20.4
Men	3,807	96.3	No	3,146	79.6
Race or ethnicity			Bipolar disorder		
White	2,865	72.5	Yes	411	10.4
African American	737	18.6	No	3,542	89.6
Latino	287	7.3	Psychosis		
Other	64	1.6	Yes	483	12.2
Age			No	3,470	87.8
<50	647	16.4	Posttraumatic stress disorder		
50–64	1,462	37.0	Yes	574	14.5
65–74	1,008	25.5	No	3,379	85.5
≥75	836	21.1	Schizophrenia		
Marital status			Yes	481	12.2
Married	1,972	49.9	No	3,472	87.8
Not married	1,981	50.1	Substance use disorder		
Priority status			Yes	709	17.9
Service-connected disability >30%	869	22.0	No	3,244	82.1
Service-connected disability <20%	774	19.6	Diabetes medication use		
Non–service-connected disability			No medication	1,599	40.5
Low income	2,050	51.9	Only oral medication	1,341	33.9
High income	260	6.6	Only insulin	687	17.4
Medicare use			Both oral and insulin medications	326	8.2
Dual VHA and Medicare use	2,386	60.4	HbA1c control		
VHA use and no Medicare use	1,567	39.6	Excellent (HbA1c value of <7%)	639	16.2
Charlson Comorbidity Index score[b]			Good or fair (HbA1c value of 7%–9%)	723	18.3
0	96	2.4	Poor (HbA1c value of >9%)	455	11.5
1	1,134	28.7	No HbA1c test	2,136	54.0
2	892	22.6	Mental health specialty visit[c]		
≥3	1,831	46.3	Yes	1,482	74.1
			No	519	25.9

[a] Data based on VHA clinic users with diabetes and incident major depressive disorders between February 1, 1999, and September 30, 1999, and who were followed for 180 days after the depression diagnosis date and who were not enrolled in Medicare health maintenance organizations and who were alive at the end of the follow-up period.

[b] Possible scores range from 0 to 37, with higher scores indicating greater comorbidity.

[c] Mental health specialty visits based on only 2,001 adults, who received any antidepressant treatment for depression

tors indicated that an overwhelming majority of VHA patients (90%) attained dosage adequacy (19). Our measure of guideline-consistent antidepressant treatment was derived from duration of medication use, which was based on the NCQA's Health Plan Employer Data and Information Set (HEDIS) report on antidepressant medication management (17). On the basis of prior publications in the VHA (19,20) and guidelines for the treatment of major depression (21), we defined patients as receiving guideline-consistent antidepressant treatment if they were treated with antidepressant medications for at least three months within a six-month (180 days) follow-up period after diagnosis. The mean±SE number of days per prescription within the 180 days was 31.8±14.0, with only 5.7% having 90-day prescriptions.

Independent variables

Independent variables consisted of veterans' demographic characteristics, economic characteristics, access to care, and health status measured during FY 1999. In addition, we used glycemic control and use of antiglycemic medications before the incident depression diagnosis date as independent variables to explain variations in guideline-consistent treatment.

Demographic characteristics were represented by gender, race or ethnicity (white, African American, Latino, and other), age (under 50 years, 50–64 years, 65–74 years, and 75 and older), and marital status (married versus others). Priority group status in the VHA was used to measure coverage: service-connected disability >30% (VHA priority groups 1 and 4), service-connected disability <20% (groups 2, 3, and 6), low income (group 5), and high income (group 7). Measures of health status included physical comorbidity, other mental illness, and substance abuse. Physical comorbidity was measured by the Charlson Comorbidity Index (CCI) derived from ICD-9-CM codes (22,23). Other mental disorders included schizophrenia (ICD-9 295), other psychoses (ICD-9 296.3, 297.0, and 298.0), bipolar disorder (ICD-9 296.0, 296.1, and 296.4–296.8), anxiety disorders (ICD-9 300.0, 300.2, 300.3, and 308.3), and posttraumatic stress dis-

order (PTSD) (*ICD*-9 309.81). Substance use disorders included presence of substance abuse and dependence (alcohol, tobacco, and drugs), by *ICD*-9 codes 304, 303, and 305.

Access-to-care variables. Access-to-care variables included dual VHA and Medicare use and mental health specialty sector care. For veterans using the VHA, Medicare is an important source of health care coverage (24–27). Although Medicare did not cover prescription drugs during our observation period, it is possible that dual use may lead to fragmented care and such fragmented care may result in reduced access or continuation of treatment because of the difficulty in coordinating care between the two systems.

Patients treated by psychiatrists in the mental health specialty sector tend to have more severe mental disorders than patients treated by other health care professionals (28). In addition, receipt of mental health specialty care is strongly associated with improved adherence to medications (29–31). In Medicare, provider specialty codes 26, 62, 80, and 86 represented visits to psychiatrists, psychologists, and clinical social workers. In VHA files, clinic stop codes were used to identify mental health specialty care. This measure was defined as use either at the start or during the incident depression treatment episode.

Antiglycemic medications and glycemic control. Concerns have been raised about the negative impact of tricyclic antidepressants on glycemic control (32). We measured glycemic control with hemoglobin A1c (HbA1c) values before the incident depression diagnosis date. We used stratification values based on guidelines suggested by the American Diabetes Association and the VA–Department of Defense (33)—that is, we stratified HbA1c values taken before the incident depression into one of three groups: <7% (optimal control), 7%–9% (good or fair control), and >9% (poor control). For those who did not have an HbA1c test, we included an indicator variable. Antiglycemic medication use before the incident depression diagnosis date was grouped into four classes: no oral

Table 2

Receipt of any antidepressant treatment among persons with diabetes and incident depression who used the Veterans Health Administration (VHA) for health care, fiscal year 1999[a]

Variable	Any antidepressant treatment (N=2,001)			Logistic regression		
	N	%	p	AOR	95% CI	p
Gender						
Women	77	52.7		1.13	.79–1.62	
Men	1,924	50.5				
Race or ethnicity			.06			
White	1,458	50.9				
African American	352	47.8		.81	.68–.97	<.05
Latino	162	56.4		1.08	.83–1.40	
Other	29	45.3		.74	.44–1.25	
Age			<.001			
<50	383	59.2				
50–64	856	58.5		.89	.72–1.09	
65–74	467	46.3		.58	.46–.74	<.001
≥75	295	35.3		.38	.29–.50	<.001
Marital status			<.01			
Married	1,046	53.0		1.26	1.09–1.45	<.01
Not married	955	48.2				
Priority status			<.001			
Service-connected disability >30%	362	41.7		.72	.60–.86	<.001
Service-connected disability <20%	446	57.6		1.18	.99–1.41	
Non–service-connected disability						
Low income	1,072	52.3				
High income	121	46.5		.88	.67–1.16	
Medicare use			<.001			
Dual VHA and Medicare	1,321	55.4		1.14	.97–1.33	
VHA use and no Medicare	680	43.4				
Charlson Comorbidity Index[b] score			<.001			
0	47	49.0				
1	637	56.2		1.20	.77–1.87	
2	495	55.5		1.29	.82–2.03	
≥3	822	44.9		1.10	.70–1.72	
Anxiety						
Yes	433	53.7		1.06	.89–1.24	
No	1,568	49.8				
Bipolar disorder			<.01			
Yes	178	43.3		.69	.55–.86	<.01
No	1,823	51.5				
Psychosis			<.001			
Yes	183	37.9		.70	.56–.87	<.01
No	1,818	52.4				
Posttraumatic stress disorder			<.001			
Yes	346	60.3		1.19	.98–1.45	
No	1,655	49.0				
Schizophrenia			<.001			
Yes	171	35.6		.50	.40–.63	<.001
No	1,830	52.7				
Substance use disorder						
Yes	377	53.2		.98	.81–1.19	
No	1,624	50.1				
Diabetes medication use			<.001			
No medication	724	45.3				
Only oral medication	761	56.7		1.27	1.08–1.50	<.01
Only insulin	335	48.8		.97	.80–1.19	
Both oral medication and insulin	181	55.5		1.11	.85–1.46	

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Table 2

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Variable	Any antidepressant treatment (N=2,001)			Logistic regression		
	N	%	p	AOR	95% CI	p
HbA1c control			<.001			
Excellent (HbA1c value of <7%)	335	52.4		.93	.72–1.21	
Good or fair (HbA1c value of 7%–9%)	397	54.9		.91	.70–1.17	
Poor (HbA1c value of >9%)	266	58.5				
No HbA1c test	1,003	47.0		.88	.69–1.11	
Mental health specialty visit			<.001			
Yes	1,482	56.9		2.19	1.89–2.53	<.001
No	519	38.4				

[a] Data based on 3,953 VHA clinic users with diabetes and incident depressive disorders between February 1, 1999, and September 30, 1999, and who were followed for 180 days after the depression diagnosis date and who were not enrolled in Medicare health maintenance organizations and who were alive at the end of the follow-up period. The p values denote statistically significant subgroup differences based on chi-square tests and logistic regression.
[b] Possible scores range from 0 to 37, with higher scores indicating greater comorbidity.

medication or insulin use, oral medication use only, insulin use only, and both oral medication and insulin use. Because an overwhelming majority (95%) of individuals were prescribed the new-generation antidepressant medications, we did not control for type of antidepressant medication use.

Statistical procedures

Chi square tests were used to test unadjusted subgroup differences in dependent variables. Logistic regressions were used to examine the patterns of any treatment and guideline-consistent treatment by demographic characteristics (gender, race or ethnicity, and marital status), economic characteristics (VHA priority status), access to care (dual VHA and Medicare use and mental health specialty care), health status (physical comorbidity and other mental illness), and other characteristics (HbA1c control and substance abuse). The parameter estimates were converted to odds ratios and their associated 95% confidence intervals (CIs).

Results

Table 1 describes VHA users with incident major depressive disorder and diabetes. The study population was overwhelmingly male (96%) and white (73%); 19% were African American and 7% were Latino. The median age was 64 years, and 47% of the VHA patients were over the age of 65 years. A majority of veterans (52%) were eligible for VHA enrollment because of their low income. Over half (60%) the study population had dual Medicare and VHA use. Only 2% of the study population did not have other physical illnesses, according to their CCI score. Anxiety disorders were the most common psychiatric comorbid condition (20%), followed by PTSD (15%). Over half (54%) did not have an HbA1c test before the date of their incident depression diagnosis, and 12% had poor HbA1c control.

Among VHA users with diabetes and incident depression, 51% (N= 2,001) had at least one prescription for an antidepressant. In the multivariate analysis, the significant predictors were African-American race, older age, marital status, VHA priority group status, psychiatric comorbidities (except anxiety disorders and PTSD), diabetes medication use, and treatment by a mental health specialist (Table 2). African Americans were less likely than whites to have an antidepressant prescription filled (adjusted odds ratio [AOR]=.81, p<.05). Veterans over age 65 were less likely than individuals younger than 50 years to be treated with antidepressants for depression (p<.001). Those who were seen in the mental health specialty care sector were twice as likely as those seen in primary care to fill an antidepressant prescription (AOR=2.19, 95% p<.001). Those who had a prescription for oral antiglycemic agents alone were more likely than those with no prescription for oral antiglycemic agents alone to fill an antidepressant prescription (AOR=1.27, p<.01). Prior glycemic control was not associated with the likelihood of receiving antidepressant treatment.

Among veterans with incident depression and diabetes who were treated with antidepressants, 62% had guideline-consistent treatment. Among all VHA users with diabetes and incident depression, this translates into an overall share of 31.4%. Significant predictors of guideline-consistent treatment were African-American race, older age (75 years or older), marital status, substance use disorders, and being seen in the mental health specialty sector (Table 3). African-American race had a negative association with the likelihood of receipt of guideline-consistent treatment, compared with whites (AOR= .64, p<.001). Those who were seen in the mental health specialty sector were more likely than those who were not seen in that sector to receive guideline-consistent treatment (AOR= 1.62, p<.001). None of the psychiatric comorbidities were associated with the likelihood of guideline-consistent antidepressant treatment. Individuals with substance use disorders were less likely to receive guideline-consistent treatment, compared with those who did not have a diagnosis of substance use disorder.

In assessing guideline-consistent antidepressant treatment, we counted a veteran who was given a 90-day prescription as having guideline-consistent treatment for depression. To ensure the robustness of the findings, we excluded 71 individuals whose first prescription was for a 90-day supply. Even with the exclusion of these individuals, our bivariate and multivariate findings remained consistent with those reported in the main analysis.

Because guideline-consistent treat-

ment for depression may be related to treatment versus no treatment, a joint choice model was used to analyze treatment and continuity within a multivariate framework. An approach that accounts for the dependence between seeking treatment for depression and guideline-consistent treatment is the maximum likelihood model with selection. This specification jointly models the probability of choosing treatment and the probability of continuing treatment. This was implemented through the heckprob procedure in Stata, version 8 (34). For identification purposes, we also included additional variables (metropolitan area versus nonmetropolitan area and U.S. region [Northeast, West, Midwest, and South]) in modeling any depression treatment. The guideline-consistent treatment equation did not contain metropolitan area and U.S. region variables. The estimated models indicated that the correlation term between the two equations (rho) was not significantly different from zero (χ^2=.33, p > χ^2=.57), suggesting that the outcomes (any treatment and continuation of treatment) could be modeled separately. Therefore, findings are based on separate regressions on any treatment and guideline-consistent treatment among those who received any antidepressants for depression treatment.

Since the publication of guidelines established by the National Depression Panel, the NCQA has developed a quality compass to establish standardized specifications and implementation of guidelines for many conditions. These guidelines are based on data gathered from HEDIS (35). NCQA's set of depression management indicators are from administrative databases in over 300 health plans and measure the population in treatment—that is, diagnosed patients who initiate antidepressant medication. NCQA has established criteria for measuring treatment of depression for adults diagnosed as having a new episode of depression and initiated on an antidepressant drug and who received a continuous trial of medication treatment during the acute treatment phase (36). The NCQA criteria include individuals diagnosed as having a new episode of

Table 3

Receipt of guideline-consistent antidepressant treatment among persons with diabetes and incident depression who used the Veterans Health Administration (VHA) for health care, fiscal year 1999[a]

Variable	Guideline-consistent treatment (N=1,243)			Logistic regression		
	N	%	p	AOR	95% CI	p
Gender						
Women	53	68.8		1.50	.90–2.50	
Men	1,190	61.9				
Race or ethnicity			<.001			
White	936	64.2				
African American	181	51.4		.64	.49–.82	<.001
Latino	110	67.9		1.15	.80–1.64	
Other	16	55.2		.73	.34–1.57	
Age			<.01			
<50	226	59.0				
50–64	568	66.4		1.17	.90–1.53	
65–74	283	60.6		.80	.58–1.11	
≥75	166	56.3		.65	.45–.96	<.05
Marital status			<.001			
Married	689	65.9		1.31	1.07–1.59	<.01
Not married	554	58.0				
Priority status						
Service-connected disability >30%	211	58.3		.85	.66–1.10	
Service-connected disability <20%	280	62.8		1.06	.83–1.35	
Non–service-connected disability						
Low income	667	62.2				
High income	85	70.2		1.40	.92–2.13	
Medicare use						
Dual VHA and Medicare	825	62.5		.86	.68–1.09	
VHA use and no Medicare	418	61.5				
Charlson Comorbidity Index score[b]						
0	30	63.8				
1	397	62.3		.77	.40–1.45	
2	315	63.6		.80	.42–1.54	
≥3	501	60.9		.77	.40–1.46	
Anxiety						
Yes	276	63.7		1.07	.85–1.34	
No	967	61.7				
Bipolar disorder			<.05			
Yes	96	53.9		.73	.52–1.01	
No	1,147	62.9				
Psychosis						
Yes	105	57.4		.98	.70–1.37	
No	1,138	62.6				
Posttraumatic stress disorder						
Yes	211	61.0		.91	.70–1.19	
No	1,032	62.4				
Schizophrenia			<.001			
Yes	86	50.3		.75	.53–1.06	
No	1,157	63.2				
Substance use disorder			<.001			
Yes	201	53.3		.75	.58–.97	<.05
No	1,042	64.2				
Diabetes medication use			<.01			
No medication	414	57.2				
Only oral medication	499	65.6		1.24	.98–1.56	
Only insulin	205	61.2		1.12	.83–1.50	
Both oral medication and insulin	125	69.1		1.42	.97–2.07	

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Table 3

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Variable	Guideline-consistent treatment (N=1,243)			Logistic regression		
	N	%	p	AOR	95% CI	p
HbA1c control			<.01			
Excellent (HbA1c value of <7%)	227	67.8		1.26	.88–1.80	
Good or fair (HbA1c value of 7%–9%)	261	65.7		1.02	.72–1.43	
Poor (HbA1c value of >9%)	171	64.3				
No HbA1c test	584	58.2		.88	.64–1.20	
Mental health specialty visit			<.001			
Yes	956	64.5		1.62	1.30–2.01	<.001
No	287	55.3				

[a] Data were based on 2,001 VHA clinic users with diabetes and incident depressive disorders between February 1, 1999, and September 30, 1999, and who were followed for 180 days after the depression diagnosis date and who were not enrolled in Medicare health maintenance organizations and who were alive at the end of the follow-up period. The p values denote statistically significant subgroup differences based on chi square tests and logistic regression.

[b] Possible scores range from 0 to 37, with higher scores indicating greater comorbidity.

major depression (*ICD-9-CM* codes 296.2, 296.3, 298.0, 300.4, 309.1, and 311). Therefore, we also conducted all analyses with the broader criteria of depression diagnosis. We found that patterns were generally consistent for any antidepressant treatment and guideline-consistent antidepressant treatment. (Findings from these analyses are available from the first author on request.)

Discussion

Ours is the first nationwide study to analyze antidepressant treatment patterns among veterans with diabetes and an incident depression diagnosis. Because there have been no other nationwide studies that deal with depression treatment among adults with diabetes in the VHA, we were not able to directly compare treatment rates from our study with others. However, we did find that compared with a single-facility study that examined veterans with diabetes and depression (12,13), our nationwide study had higher rates of receipt of any antidepressant treatment and treatment duration; our study also had higher rates than a study of the general population (37). Guideline-consistent treatment rates in our study population were lower than the 85% observed in the general population of VHA users with major depres-

sion (20). By using a nationally representative household survey, it was found that early discontinuation of antidepressant therapy is widespread in the general population with depression, with only 27.6% of the patients continuing antidepressant therapy for more than 90 days (37). Katon and colleagues (8) found that only 36.3% of primary care patients had continued treatment for depression for 180 days.

Although receiving care in the mental health specialty sector was associated with a higher likelihood of receiving any treatment and guideline-consistent treatment, opportunities do exist to improve guideline-consistent antidepressant treatment among VHA clinic users with diabetes. There is emerging evidence that collaborative care was significantly more successful at reducing depressive symptoms than usual primary care among patients with diabetes (38). Indeed, increased primary care–mental health subspecialty care paradigms are being introduced within the VHA, which may be one way to increase guideline-consistent depression treatment among VHA users with diabetes and major depressive disorder (39).

The antidepressant prescription patterns suggest that specific comorbid mental disorders, including bipolar

disorder, schizophrenia, and psychoses, were associated with lower rates of any antidepressant treatment and that substance use disorders were negatively associated with guideline-consistent antidepressant treatment. Although the reasons for these patterns remain unclear, antidepressant treatment of bipolar disorder increases the risk of treatment-emergent mania or hypomania (40), and the clinical role of antidepressants in the management of schizophrenia is limited (41). In addition, prior research has linked substance use disorders (42) and schizophrenia (43) with increased risk of antidepressant nonadherence.

Lack of an association between antidepressant treatment and poor glycemic control and the finding that a majority of individuals were on new-generation antidepressants together suggest that poor glycemic control was not a barrier to treatment. Increased use of antidepressants was observed among veterans on oral hypoglycemic medications. A plausible explanation could be that veterans are highly likely to be adherent to hypoglycemic medication. Because they have high adherence to one type of medication, they may also have high adherence to any type of prescribed medication, regardless of type of medication.

The demographic differences with respect to African-American race and older age are consistent with the existing research. As in other depression-related research (44), African Americans were less likely to receive any treatment. On the one hand, our observations are consistent with earlier work indicating that racial differences persist even when insurance status and socioeconomic status are controlled for (45). Although not specific to diabetes or the VHA, previous research suggests that persons from racial or ethnic minority groups are more likely than whites to report major depression without medication use (46). In clinical settings, white patients with major depression were nearly three times more likely than nonwhite patients with major depression to receive a recommendation for an antidepressant medication and almost twice as likely to have been treated with one (47). Despite the in-

crease in office-based prescription of antidepressants between 1992–1993 and 1994–1995, prescription rates for African-American and Hispanic patients were less than half the rate for whites (48,49). Even among a poor nonelderly sample with Medicaid, racial variations in access to selective serotonin reuptake inhibitors and other antidepressants have been documented (50,51). However, in the VHA, racial differences are not consistent across indicators or illnesses. For example, in a study among veterans racial differences were found in some measures and not in others (52).

An increasing trend in physician recognition of depression among the elderly over 65 years of age has been documented (53). However, our finding that older individuals were less likely to be treated with antidepressants for depression is consistent with other studies in which less than one-third of elderly primary care patients diagnosed as having depression received an antidepressant (54).

The strengths of our study are a nationwide database, availability of detailed pharmacy information, comprehensive diagnostic information from both VHA and Medicare, and information on glycemic control that is not typically available in administrative databases. However, some study limitations need to be noted. A limitation that is common to all studies that focus on the veteran population is that the study population is primarily elderly, low-income, male veterans who have higher rates of comorbid physical conditions and mental disorders. This limits the generalizability of the results. Our data include only individuals with diagnosed depression and cannot capture undiagnosed depression (55–57). It is known that depression may be undercoded (58). Yet another limitation is our inability to capture service use in Medicare HMOs, an important source of health care delivery for veterans (59). However, an examination of a profile of individuals with HMO enrollment did suggest similar gender and racial or ethnic composition and VHA enrollment status.

Although the data terminate in 2000, they have been extensively validated (60,61) and permit comparison with other studies from the same pe-

riod. In addition, the results will serve as a baseline against which to measure secular change. The two studies by Jones and colleagues (12,13), which used data from January 1997 through April 2005, show that 63% of VHA users with depression did not receive antidepressants within six weeks of a depression diagnosis. Although these studies did not model depression treatment patterns among those with diabetes and major depression, racial differences (p=.06) were apparent in the study.

Conclusions
Despite our study's limitations, our findings suggest that even in a health care system that has generous pharmacy benefits and where access is equalized, guideline-consistent depression care is lower for certain subgroups of individuals. Further research is necessary to evaluate the reasons for this finding. Our study results do point to opportunities, such as mental health specialty care, that exist for improving antidepressant treatment among veterans with diabetes and depression.

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