

# Depression Screening Disparities Among Veterans With Diabetes Compared With the General Veteran Population

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**OBJECTIVE** — We sought to describe the proportion of veterans with diabetes screened for depression compared with the general population of veterans.

**RESEARCH DESIGN AND METHODS** — Electronic medical records (fiscal years 2001–2004) from a Midwestern Veterans Health Administration (VHA) facility and VHA External Peer Review Program (EPRP) data were used for the study. Facility-level data included inpatient and outpatient encounters, which included depression screen results. EPRP data were facility-level summary data, which detailed the proportion of general population veterans nationwide and patients at the Midwestern facility who were screened for depression. Logistic regression tested for associations between depression screen receipt and screening positive and demographic/clinical characteristics among patients with diabetes.

**RESULTS** — Depression screening among those with diabetes improved from 62% in fiscal year 2001 to 83% in 2004. Screening was 9–23% lower and 11–22% lower in patients with diabetes compared with the general population of veterans nationwide and patients at the Midwestern facility, respectively. Seventeen percent of subjects with diabetes screened positive, which is two times higher than in the general population. Women (odds ratio 0.45 [95% CI 0.35–0.60]) and subjects with unknown A1C (0.40 [0.34–0.46]) were less likely to be screened for depression. A  $\geq 50\%$  service-connected disability rating was inversely associated with screening (0.84 [0.72–0.99]) but positively associated with screening positive for depression (1.56 [1.33–1.82]).

**CONCLUSIONS** — Screening for depression among veterans with diabetes improved 21% but is considerably lower than the proportion of general population veterans screened nationally and at the facility of interest. Targeted interventions to improve screening in patients with diabetes are required based on evidence that screening translates into increased provider recognition and treatment of depression.

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**D**epression is a common, yet serious, debilitating and costly illness in patients with diabetes. Nearly 15% of patients with diabetes meet criteria for major depression, and as many as 33% have clinically significant depressive symptoms (1). Comorbid diabetes and depression may result in poor clinical outcomes, impaired health status, eco-

nom ic burden, increased health care utilization, and poor self-care behaviors (2–8). These adverse outcomes highlight the necessity of early depression detection and appropriate treatment.

Depression is twice as common in individuals with diabetes but is recognized one-half as frequently as those without diabetes (1,9,10). In routine practice, de-

pression is recognized in only 25% of patients with diabetes, which is lower than the 50% recognition rate in the general population (9,10). Depression may be recognized less frequently in patients with diabetes due to competing clinical demands (11). Individuals with diabetes have more medical comorbidity than those without diabetes (12). Those with diabetes also have significant other diabetes-related comorbidity (e.g., microvascular disease) that requires ongoing clinical attention. Recognition of depression may be troublesome among patients with diabetes given the overlap of symptoms. For example, fatigue is a symptom of both depression and poorly controlled diabetes, but patients and/or providers may equate fatigue with hyperglycemia rather than recognizing that fatigue may also be the harbinger of depression. Health care utilization is an unlikely reason for the observed disparities in depression recognition given that patients with diabetes utilize health care as frequently, if not more, than patients without diabetes (13–15).

Regular screening for depression may be the gateway to improve recognition of depression in patients with diabetes. Screening for depression is efficacious, cost-effective, feasible, and is recommended in clinical practice guidelines published by the American Diabetes Association (16–18). The U.S. Preventive Services Task Force issued recommendations regarding regular screening of adults, particularly where systems are in place to accurately diagnose, effectively treat, and provide follow-up care (19). The Veterans Health Administration (VHA) is one such system of health care and has mandated annual depression screening in primary care clinics since 1997.

According to the VHA External Peer Review Program (EPRP), a program that collects data for quality improvement purposes, >95% of veterans have received an annual depression screen since fiscal year 2004 (20). On average, almost 9% of veterans screen positive for depression (21). However, research has not yet focused on high-risk veteran populations,

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**Abbreviations:** EPRP, External Peer Review Program; VHA, Veterans Health Administration.

A table elsewhere in this issue shows conventional and Système International (SI) units and conversion factors for many substances.

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such as those with diabetes, to determine if the same findings would apply.

Although the VHA is a closed system of health care in which policy mandates annual screenings, resources are available to perform screenings, and annual screening rates are high, it has yet to be determined if veterans with diabetes receive the same level of depression screening as the general population of veterans. If veterans with diabetes are less frequently screened for depression than veterans in the general population, then the lower rates of depression recognition observed in patients with diabetes may be explained.

The primary objectives of this study were to determine if veterans with diabetes at a Midwestern VHA facility were screened for depression as frequently as the general population of veterans nationwide and at the facility of interest, as well as factors predicting screening and screening positive for depression. We hypothesized that veterans with diabetes were less likely to be screened due to competing clinical demands and that perceived symptoms are attributable to diabetes, not harbingers of depression.

## RESEARCH DESIGN AND METHODS

### Study data

Linked administrative and clinical data from a Midwestern VHA facility were obtained for veterans with diabetes from the data warehouse at the facility of interest. The data warehouse includes all inpatient and outpatient encounters (primary care, mental health, and specialty medicine) obtained from the facility's electronic medical record. The depression screen data (available from 1 January 2000 to 30 April 2005) included screening dates and screen results. EPRP summary data (fiscal years 2001–2004) were obtained from the VHA's intranet (20). EPRP data contained only summary information at the facility level (i.e., patient-level information was not available).

### Study population

**Population with diabetes.** Diabetes was identified from the facility data using validated criteria for VHA data, which specify indication of two or more ICD-9 codes for diabetes (250.xx) in inpatient and/or outpatient data over a 24-month period and/or receipt of a diabetes prescription medication (22). Subjects may have been eligible for depression screening in multiple years during the period of analysis.

**General population.** The general population was comprised of veterans included in EPRP medical record chart abstraction. EPRP focuses on a random sample of veterans with diabetes, chronic obstructive pulmonary disease, ischemic heart disease, hypertension, or none of the previous conditions at each of the VHA facilities nationwide, including the facility of interest.

### Inclusion criteria

Inclusion criteria were based on EPRP performance measure criteria (23). The index date was 1 October of each fiscal year (for subjects with diabetes) or the date the medical record was abstracted (for the general population). Subjects with diabetes were required to have met the diabetes criteria before the fiscal year start to be included in analyses for that particular year. EPRP criteria required that a primary care visit occurred 1) in the second calendar year prior to the index date and 2) during the fiscal year of interest (for subjects with diabetes) or in the 1-year period prior to the index date (for the EPRP population).

### Dependent variables

The following dichotomous outcomes were examined: 1) depression screen receipt (yes/no) in primary care and 2) screening result (positive/negative).

The VHA facility of interest uses the Patient Health Questionnaire-2 to screen for depression. It is a valid instrument for depression screening, as indicated by a sensitivity of 91%, specificity of 65%, and positive predictive value of 37% (24). VHA facilities nationwide may use any nationally recognized standardized screening instrument (e.g., Center for Epidemiologic Studies Depression scale). The available EPRP data did not include information regarding screening results; thus, comparisons with subjects with diabetes were not performed.

### Covariates

Demographic and clinical characteristics were chosen a priori based on information in the literature. Demographic characteristics include age, sex, race, marital status, and service-connected disability percentage, which determine priority for VHA clinic appointments and medication copayment. Medical comorbidity was based on a count of conditions included in the Elixhauser Comorbidity Index and other conditions prevalent in veterans using the Klabunde methodology (25–27).

Psychiatric comorbidity was based on presence/absence of an Axis I DSM-IV condition, excluding unipolar depression. Average glycemic control, as measured by A1C laboratory values, was also included.

### Statistical analysis

$\chi^2$  tests were used to compare categorical variables and *t* tests to compare continuous variables. A linear test for trend was used to determine if the proportion of veterans with diabetes screened for depression increased from 2000 to 2004. Univariate and multivariate logistic regression models were developed to examine multivariable associations of demographic and clinical characteristics with depression screening among subjects with diabetes during fiscal year 2004.

The proportion of veterans with diabetes who were screened for depression was compared with proportions reported in the general population of veterans nationwide and at the facility of interest. Comparison of the proportion screened served to determine whether veterans with diabetes received depression screening at the same level as other veterans.

All analyses were conducted using SAS 9.1 (SAS Institute, Cary, NC). Two-tailed tests were used to determine statistical significance, with  $\alpha$  set at 0.05. The institutional review boards at the VA facility, and Indiana University approved this study.

**RESULTS**— Characteristics of the population with diabetes at the Midwestern VHA facility who were eligible for depression screening in fiscal year 2004 are summarized in Table 1. The population was predominately elderly (mean  $\pm$  SD age  $66.5 \pm 11.2$  years), Caucasian (59%), male (97%), married (63%), and without service-connected disability (68%). Subjects had an average of  $2.9 \pm 2.0$  medical comorbidities and  $0.4 \pm 0.8$  mental health comorbidities. Mean A1C was  $7.4 \pm 1.5\%$ . Demographic and clinical characteristics were similar in fiscal years 2001–2003.

Following national trends, depression screening in the population with diabetes increased  $>21\%$  ( $P < 0.0001$  for trend) during the 4-year time period, from a low of 62% in fiscal year 2001 to 83% in 2004 (Fig. 1 and Table 1). However, veterans with diabetes were less frequently screened for depression during each of the 4 years of analysis (fiscal years

Table 1—Demographic and clinical characteristics associated with depression screening among veterans with diabetes

	Overall sample (n = 8,491)		Screened for depression (n = 7,024)			Positive screen (n = 1,242)*		
	n	%	n	%	P	n	%	P
Sex					<0.0001			<0.0001
Male	8,228	96.9	6,846	83.2		1,187	17.3	
Female	263	3.1	178	67.7		55	30.9	
Age (years)					0.0022			<0.0001
<65	3,579	42.2	2,908	81.3		724	24.9	
≥65	4,912	57.9	4,116	83.8		518	12.6	
Race					0.2152			<0.0001
Caucasian	5,020	59.1	4,139	82.5		844	20.4	
Non-Caucasian	991	11.7	808	81.5		171	21.2	
Unknown	2,480	29.2	2,077	83.8		227	10.9	
Marital status					0.0031			<0.0001
Married	5,347	63.0	4,473	83.7		670	15.0	
Unmarried	3,144	37.0	2,551	81.1		572	22.4	
Service-connected disability (%)					0.0196			<0.0001
0	5,749	67.7	4,787	83.3		713	14.9	
1–49	1,337	15.8	1,111	83.1		201	18.1	
≥50	1,405	16.7	1,126	80.1		328	29.1	
No. medical comorbidities					<0.0001			0.1003
0	1,218	14.3	920	75.5		151	16.4	
1	1,006	11.9	810	80.5		140	17.3	
2	1,580	18.6	1,345	85.1		215	16.0	
3+	4,697	55.2	3,949	84.3		736	18.6	
Psychiatric comorbidity					0.8580			<0.0001
Yes	2,772	32.7	2,296	82.8		597	26.0	
No	5,719	67.4	4,728	82.7		645	13.6	
A1C					<0.0001			0.0187
<7%	3,198	37.7	2,729	85.3		441	16.2	
≥7%	3,984	46.9	3,381	84.9		640	18.9	
Unknown	1,309	15.4	914	69.8		161	17.6	
Fiscal year					<0.0001†			0.1817†
2001	3,991		2,464	61.7		407	16.5	
2002	5,652		3,939	69.7		681	17.3	
2003	7,145		5,780	80.9		1,070	18.5	
2004	8,491		7,024	82.7		1,242	17.7	

\*Table reflects information pertaining to the 8,491 veterans with diabetes who were eligible for depression screening in fiscal year 2004. \*Among n = 7,204 veterans screened for depression; information pertaining to fiscal year describes veterans who were eligible for screening in fiscal years 2001–2004. †Test for trend.

2001–2004) compared with the general population of veterans nationwide and patients at the facility of interest. The proportion of eligible subjects with diabetes who were screened for depression was 9–23% lower and 11–22% lower compared with the proportion of subjects screened for depression in the general population of veterans nationwide and at the facility of interest, respectively.

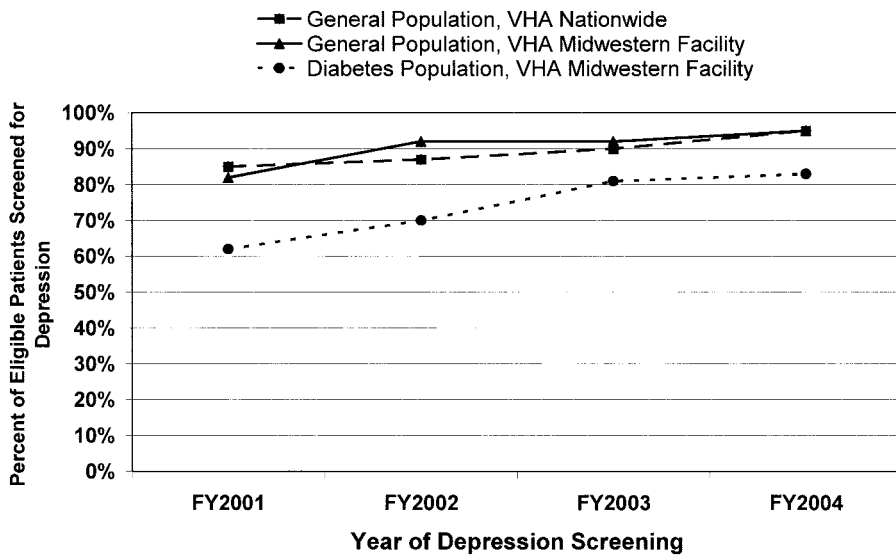
On average, 17.7% of subjects with diabetes at the Midwestern facility who were screened for depression screened positive, which is more than two times higher than the 8.8% rate reported in the general population of veterans (21) (Table 1). The proportion of subjects with diabetes at the Midwestern facility

who screened positive for depression remained stable ( $P > 0.05$  for trend) over the time period, ranging from 16.5% in fiscal year 2001 to 18.5% in 2003.

The results of the univariate and multivariate regression analysis for predicting screening receipt and screening positive are shown in Table 2. In the univariate analysis, female sex, younger age (<65 years), not being married, ≥50% service-connected disability, and unknown A1C levels were associated with a lower odds for depression screening receipt. In multivariate analysis, these results were diminished, with few exceptions. In particular, women were 55% less likely (odds ratio [OR] 0.45 [95% CI 0.35–

0.60]) to be screened for depression than men in multivariate analysis. A ≥50% service-connected disability rating was inversely associated with screening receipt (0.84 [0.72–0.99]). Lack of A1C testing predicted lower odds of screening receipt (0.40 [0.34–0.46]).

Female sex was associated with higher odds for screening positive in univariate analysis, but the elevated odds did not persist after adjusting for salient covariates. A ≥50% service connection was positively associated with screening positive (OR 1.56 [95% CI 1.33–1.82]) in multivariate analysis. Lack of A1C testing did not influence screening results (0.96 [0.78–1.18]).



**Figure 1**—Depression screening receipt in the general population of veterans nationwide, the general population of veterans at a Midwestern VHA facility, and in veterans with diabetes at a Midwestern VHA facility, 2000–2004.

**CONCLUSIONS**— Screening for depression has been mandated in VHA primary care clinics since 1997 and has also been recommended by several other national organizations, including the U.S. Preventive Services Task Force and American Diabetes Association (18,19). Unlike many health care systems, resources to screen, treat, and provide follow-up depression care are readily available in the VHA, the nation’s largest, most integrated system of health care. In this study, we

found that veterans with diabetes at a Midwestern VHA facility were less likely to be screened for depression than the general population of veterans nationwide and at the facility of interest. Because local screening trends for the general population were consistent with the increases in screening nationally, this finding suggests that diabetes is a risk factor for screening failure. The findings of this study illuminate the need to identify barriers to depression screening in high-risk

populations and to devise measures to improve depression screening, particularly based on evidence that depression is recognized 50% less frequently in patients with diabetes (9,10). To our knowledge, this is the first study to compare receipt of depression screening in a high-risk population of veterans with diabetes with the general population of veterans.

Lower rates of depression screening among veterans with diabetes are concerning. On average, 74% of eligible veterans with diabetes at the Midwestern facility received an annual depression screen during fiscal years 2001–2004 compared with 89–90% of the general population of veterans nationwide and at the facility of interest. Importantly, the lower screening average in the population with diabetes cannot be attributed to poorer performance in fiscal year 2001. Despite the 21% improvement (from 62% in fiscal year 2001 to 83% in 2004) in screening receipt among subjects with diabetes at the Midwestern VHA facility, screening rates never approached the rates observed in either the general population of veterans nationwide or at the Midwestern facility—screening receipt was 9–23% lower among patients with diabetes at the Midwestern facility during fiscal years 2001–2004. It is unlikely that the observed disparities in screening receipt among those with diabetes are entirely attributable to the facilities overall

**Table 2**—Unadjusted and adjusted ORs for predicting depression screening and screening results among 8,491 veterans with diabetes, fiscal year 2004

	Screened for depression		Positive depression screen	
	Unadjusted	Adjusted	Unadjusted	Adjusted
Sex (female vs. male)	0.42 (0.32–0.55)	0.45 (0.35–0.60)	1.57 (1.16–2.13)	1.22 (0.88–1.66)
Age (≥65 vs. <65 years)	1.19 (1.07–1.34)	1.10 (0.97–1.25)	0.47 (0.41–0.53)	0.60 (0.52–0.69)
Race				
Caucasian	1.00	1.00	1.00	1.00
Non-Caucasian	0.94 (0.79–1.12)	1.00 (0.83–1.19)	1.03 (0.86–1.24)	0.87 (0.72–1.05)
Unknown	1.10 (0.96–1.25)	1.08 (0.94–1.23)	0.50 (0.43–0.58)	0.62 (0.53–0.73)
Marital status (unmarried vs. married)	0.84 (0.75–0.94)	0.89 (0.79–1.01)	1.55 (1.38–1.75)	1.35 (1.18–1.53)
Service-connected disability (%)				
0	1.00	1.00	1.00	1.00
1–49	0.99 (0.84–1.16)	1.00 (0.85–1.18)	1.25 (1.06–1.48)	1.07 (0.90–1.27)
≥50	0.81 (0.70–0.94)	0.84 (0.72–0.99)	2.15 (1.86–2.49)	1.56 (1.33–1.82)
No. medical comorbidities	1.05 (1.02–1.08)	0.99 (0.96–1.02)	1.07 (1.04–1.10)	1.03 (1.00–1.07)
Psychiatric comorbidity (yes vs. no)	1.00 (0.92–1.07)	1.00 (0.88–1.14)	1.68 (1.57–1.80)	1.65 (1.45–1.88)
A1C				
<7%	1.00	1.00	1.00	1.00
≥7%	0.96 (0.85–1.10)	0.99 (0.87–1.13)	1.20 (1.05–1.36)	1.08 (0.95–1.24)
Unknown	0.40 (0.34–0.46)	0.40 (0.34–0.46)	0.88 (0.72–1.06)	0.96 (0.78–1.18)

Data are OR (95% CI).

performance given that screening rates at the facility for all veterans were similar to rates observed nationwide in the VHA.

It is unclear why depression screening occurs less frequently among patients with diabetes. However, we speculate that competing clinical demands may help explain the findings. Screening may have been performed less frequently, since clinicians tend to focus on the constellation of medical symptoms and outcomes, rather than on the combination of medical and psychiatric problems that affect many patients with diabetes. Patients with diabetes typically have multiple comorbidities that require clinical attention (12). Primary care providers indicate that patients with diabetes are more complex to treat than other patient populations (28). In addition, primary care providers have indicated uneasiness in treating depression, suggesting that they may be unwilling to perform screenings if they do not feel they can adequately treat or provide follow-up care (29). The reason(s) why depression screens are performed less frequently in individuals with diabetes will continue to remain unknown until provider beliefs/attitudes regarding depression screening in patients with diabetes are ascertained.

The clinical implications of our findings are noteworthy. First, lack of depression screening may result in lower depression recognition and treatment rates. As would be expected, depression screening does positively influence provider recognition and treatment of depression (17,30–32). Because depression is already less frequently recognized and treated in patients with diabetes, routine screening is an important step in the detection and treatment of depression (9,10,33,34). In particular, depression screening is essential in the diabetic veteran population based on the finding that 17% of subjects with diabetes at the Midwestern facility screened positive for depression, which is twofold higher than the proportion of the general population of veterans nationwide who screened positive (20). Unrecognized and untreated depression in patients with diabetes is significant for reasons including disability, economic burden, impaired quality of life, and adverse outcomes, including poor glycemic control, morbidity, and mortality (1–8). Mandated depression screening in patients with diabetes is one method that may improve recognition and treatment rates, thereby influencing other clinical outcomes.

The implications regarding factors that predicted screening failure also bear mention. Women were 55% less likely to be screened for depression, which is worrisome because depression is at least 50% more common in women with diabetes than in men with diabetes (1). Although women were less likely to be screened for depression, female sex was not associated with increased odds for screening positive in multivariate analyses. The lack of statistical significance may have resulted due to insufficient statistical power given the small number of women ( $n = 263$ ) included in this sample. Furthermore, individuals who had not had a recent A1C test were less likely to be screened, even though evidence suggests that they may be at highest risk for depression and its associated poor outcomes (2,35,36). Finally, veterans with  $\geq 50\%$  service-connected disability represent a high-risk subpopulation for screening failure. This is an important finding because not only were they not screened but they were also significantly more likely to screen positive for depression; in addition, they are already a high-risk population for depression and other psychiatric conditions (37). Higher service-connected disability implies lower functional status, suggesting that screening failure may place an even greater burden on these veterans and the health care system due to the potential repercussions of depression nonrecognition.

The limitations of this study bear mention. First, it is possible that screening was not performed in veterans already diagnosed and under treatment for depression. Second, analyses were not performed to compare screening in veterans with diabetes with those without diabetes given the unavailability of that data. Instead, comparisons were made to the general population of veterans using EPRP data, which by definition of the EPRP sampling frame do include some veterans with diabetes. Despite this limitation, depression screening was still less commonly conducted among patients with diabetes at the Midwestern VHA facility. Third, use of administrative data to identify diabetes may have resulted in misclassification, particularly based on evidence that diabetes is overrepresented in VHA administrative databases compared with medical record review (38). To overcome this limitation, we used validated methodology for identification of veterans with diabetes (22). Finally, these results may not be generalizable to non-VHA popula-

tions given that depression screening is not mandated in other systems of health care and that the demographics of the veteran population are dissimilar to characteristics of the general U.S. population. However, we do expect the findings to generalize to other VHA facilities. The demographic and clinical characteristics of the population with diabetes at this Midwestern VHA facility are similar to those reported in both the diabetic population of veterans nationwide and the overall VHA population (22,39,40).

Despite these limitations, this study provides the first assessment of depression screening practices in a veteran population with diabetes. Results from this study provide a “best case scenario” of naturalistic depression screening practices in patients with diabetes utilizing VHA care, where annual screening in primary care clinics is a mandated policy. The VHA outperforms the general U.S. population by 21% in terms of provision of depression screening, suggesting that depression screening in patients with diabetes in community settings is likely to be substantially lower (41).

In conclusion, disparities in depression screening were observed for veterans with diabetes at a Midwestern VHA facility compared with the general population of veterans nationwide and at the facility of interest. Whether targeted screening in patients with diabetes would be more advantageous has yet to be determined. Focused efforts are needed to further improve depression screening in individuals with diabetes. Future studies to identify potential interventions should identify why depression screening is not as commonly conducted in veterans with diabetes.

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