Effect of Race/Ethnicity and Persistent Recognition of Depression on Mortality in Elderly Men With Type 2 Diabetes and Depression

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OBJECTIVE — To determine whether mortality risk from depression among elderly men with type 2 diabetes differs by ethnicity and persistent recognition of depression.

RESEARCH DESIGN AND METHODS — Data on a cohort of 14,500 male veterans with type 2 diabetes were analyzed. Diagnoses of depression and diabetes were based on ICD-9 codes. Persistent recognition was defined as an ICD-9 code for depression documented in at least the second or third visit after the initial diagnosis of depression. Hazards of death were compared using Cox proportional hazards regression models adjusting for relevant covariates.

RESULTS — Over 10 years, 2,305 deaths were documented. Mortality risk was higher for depressed than nondepressed veterans with diabetes (hazard ratio [HR] 1.6 [95% CI 1.3–1.8]). Among those with depression, mortality risk was lower with persistent recognition (0–2 visits vs. ≥3 visits after initial diagnosis, HR 0.58 [0.40–0.89]) but higher for whites than blacks (1.60 [1.11–2.31]).

CONCLUSIONS — Increased mortality from depression differs by ethnicity and persistent recognition.

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Coexisting depression increases the risk of death in people with diabetes (1,2); however, there is scant data on the effect of ethnic differences on mortality. Recognition of depression is less than optimal in primary care (3), although there is conflicting data on whether recognition of depression improves patient outcomes (4,5). To address these unanswered questions, we followed a cohort of elderly men with type 2 diabetes over a 10-year period to evaluate the effect of depression on risk of death, determine whether this risk differs by race/ethnicity, and determine whether persistent recognition of depression is associated with decreased mortality. We hypothesized that: *1*) comorbid depression would be associated with increased mortality, *2*) there would be no significant differences in mortality by race/ethnicity, and *3*) persistent recognition of depression would be associated with decreased mortality.

RESEARCH DESIGN AND METHODS

We created a cohort of adults with type 2 diabetes at a Veterans Affairs (VA) facility in the southeastern U.S. based on subjects having at least two ICD-9 codes for diabetes in either outpatient or inpatient files and two or more visits each year since diagnosis based on a previously validated algorithm (6). The study was approved by our institutional review board and local VA research and development committees.

The main outcome measure was all-cause mortality. Death was ascertained through Beneficiary Identification and Record Location files, a national database of veterans who applied for death benefits that is 95% complete (7). Length of follow-up was calculated from 8 January 1996 to either date of death or date of final follow-up on 2 March 2006.

Demographic variables included age, race/ethnicity (non-Hispanic white, non-Hispanic black, and other), marital status, and employment.

Comorbidity

We used a previously validated enhanced algorithm to identify depression (ICD-9 codes 296.2, 296.3, 296.5, 300.4, 309.4, and 311), coronary heart disease (CHD) (410–414), stroke (430–438), cancer (140–208), and hypertension (401–405) (8).

Persistent recognition of depression

We created a variable "persistent recognition of depression" to identify patients who had a documented diagnosis of depression on multiple clinic visits. We categorized this variable as ICD-9 codes for depression documented at 0/1, ≥2, and ≥3 visits after the initial diagnosis of depression.

Statistical analysis

Baseline values for demographic and clinical variables among those with and without depression were compared using pooled *t* test for continuous and χ^2 tests for categorical variables. Cox proportional hazards model regression analysis was used to compare survival times for depressed versus nondepressed patients adjusting for age at baseline, race/ethnicity, marital status, employment status, and comorbidity (CHD, hyper-

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Abbreviations: CHD, coronary heart disease.

Table 1—*Baseline characteristics* (n = *14,500*)

	Not depressed	Depressed	*P*
n	13,694	806	
Mean age (years)	61.9	56.0	<0.0001
Race/ethnicity			<0.0001
Non-Hispanic white	46.8	62.5	
Non-Hispanic black	25.7	29.2	
Other (including missing race/ethnicity)	27.5	8.3	
Marital status			<0.0001
Never married	5.8	8.6	
Married	66.9	54.3	
Separated, widowed, or divorced	27.2	37.1	
Employment status			<0.0001
Active duty or employed	21.2	10.8	
Not employed	46.8	66.9	
Retired	31.9	22.3	
Comorbid conditions			<0.0001
Cancer	5.0	13.2	
Hypertension	21.7	80.2	
CHD	12.2	40.7	
Stroke	2.6	9.4	
Mean follow-up (months)	57.5	74.2	<0.0001

Data are % unless otherwise indicated.

tension, stroke, and cancer). Depression and other comorbid conditions (CHD, hypertension, stroke, and cancer) were treated as time-dependent variables. Among subjects with diabetes and depression, separate models were run to assess differences in hazards of death by race/ethnicity and by persistence of recognition of depression, controlling for relevant covariates. All statistical analyses were performed with SAS statistical software, version 9 (SAS Institute, Cary, NC).

RESULTS — In this representative sample of 14,500 male veterans with diabetes followed for an average duration of 10 years, 2,305 (15.9%) of the study subjects died. Deaths occurred in 162 (20.1%) individuals with diabetes and comorbid depression ($n = 806$) and in 2,143 (15.6%) individuals with diabetes only ($n = 13,694$). Table 1 shows baseline characteristics of the study participants.

Multivariate-adjusted hazard ratio (HR) of deaths from all causes was significantly higher for subjects with depression than for those without depression (HR 1.6 [95% CI 1.3–1.8]). Mortality risk decreased from 0.80 (95% CI 0.57–1.11) when ICD-9 codes for depression were recorded in ≥2 visits to 0.58 (0.40–0.89) when codes for depression were recorded in ≥3 visits. Mortality risk was greater for whites than blacks (1.60 [95% CI 1.11–2.31]) or others (1.78 [1.25–2.53]).

CONCLUSIONS — This study confirms prior findings that coexisting depression increases the risk of death in people with diabetes (1,2) and offers two important new contributions. This is the first study to show racial/ethnic differences in mortality in individuals with diabetes and depression. The finding suggests that older, white men with diabetes are at increased risk of dying if they have coexisting depression than men from ethnic minority groups. These differences are independent of demographic, socioeconomic, or comorbidity characteristics. Future studies need to replicate these findings and identify potential explanatory factors.

Another major contribution of this study is the finding that persistent recognition of depression is associated with decreased risk of death. The risk of death decreased if depression was documented in the medical records at ≥3 visits. This is the first study to document this association and suggests that recognition of depression improves outcomes. Because VA guidelines mandate annual screening for depression in primary care and patients identified through this screening process usually receive ongoing treatment or referral for mental health services, it is very likely that persistent recognition is a surrogate for treatment. However, future studies need to confirm this finding.

Strengths of this study include large sample size, longitudinal cohort design, availability of comorbidity data, and treatment of comorbidity as time-dependent variables. Limitations include limited explanatory variables in our datasets, use of ICD-9 codes instead of diagnostic interviews, and unique characteristics of veterans (older age, 97% men, and more comorbidity) (6) that may limit generalizability.

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