ORIGINAL ARTICLE

Increased Medical Costs of a Population-Based Sample of Depressed Elderly Patients

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Background: We examined whether older adults with depressive symptoms below the diagnostic threshold and those with *DSM-IV* major depression and/or dysthymia have higher medical costs than those without depression.

Methods: We mailed the PRIME-MD 2-item depression screen to the patients of 2 large primary care clinics of a staff-model health maintenance organization in Seattle, Wash. All 11 679 patients 60 years and older with primary care providers at the participating clinics were included, and 8894 (76.2%) were successfully enrolled. An additional 107 patients were referred to the study by their primary care physician. Nonrespondents were slightly younger and had higher inpatient medical costs in the previous 6 months. Patients with positive findings on at least 1 item or referred by their family physician were offered an interview with the Structured Clinical Interview for *DSM-IV*. The total cost of medical services for the 6 months before the study was obtained from the cost accounting system of the health maintenance organization.

Results: Total ambulatory costs were 43% to 52% higher and total ambulatory and inpatient costs were 47% to 51% higher in depressed compared with nondepressed elderly patients after adjustment for chronic medical illness. This increase was seen in every component of health care costs, with only a small percentage due to mental health treatment. In mean costs, depressed elderly patients averaged an increase of $763 to $979 in ambulatory costs and $1045 to $1700 in ambulatory and inpatient costs. No differences in costs were noted between patients with subthreshold depressive syndromes and those with *DSM-IV* depressive disorders.

Conclusion: Depressive symptoms and *DSM-IV* depressive disorders in elderly patients are associated with significantly higher health care costs, even after adjustment for chronic medical illness.

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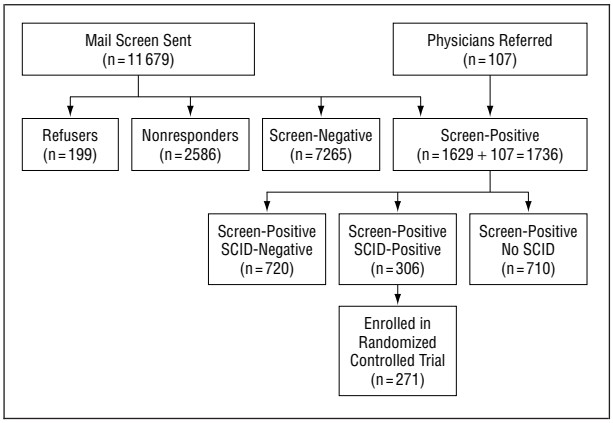
MAJOR DEPRESSION, dysthymia, and minor depression have been found to have a high prevalence in elderly primary care patients. In this group, the prevalence of major depression has been estimated at 6.5% to 9%,[1,2] dysthymia at 3% to 5%,[2,3] and minor depression at 10% to 20%.[4,5] Major and minor depression in older adults have been shown to be associated with increased unexplained physical symptoms such as headache and dizziness,[6] increased functional impairment,[7] and decreased quality of life.[8]

Several studies have also examined the impact of depression on medical costs in elderly primary care patients. Patients underwent screening in 2 studies with the Center for Epidemiologic Studies Depression Rating Scale[9]; those studies found that patients with clinically significant depressive symptoms (defined by scores of ≥16) had significantly higher total ambulatory medical costs for periods of 9 months[10] and 4 years.[11] A recent study also showed that elderly patients diagnosed by their primary care physician as having depression had increased total ambulatory costs and combined ambulatory and inpatient costs compared with control subjects during a 1-year period.[12]

These 3 studies have left several questions unanswered, including whether patients with subthreshold depressive syndromes have as high medical costs as patients who meet diagnostic criteria for major depression and/or dysthymic disorder. It is also not clear whether higher costs are found in all depressed older adults or only in those who use health care services regularly. Older adults may perceive depression as a "natural" reaction to difficult life circumstances (such as the death of a spouse or the stress of being a caretaker) and, therefore, not seek help.[13] Elderly patients may also have more stigmatized attitudes about mental illness,



Procedure for the selection of study patients. Groups are described in the "Recruitment" subsection of the "Methods" section. SCID indicates Structured Clinical Interview for *DSM-IV*.

which may inhibit them from seeking care.[13,14] Because the older persons may be less likely to seek mental health or primary care services for depression, it is unclear whether high use of medical care would be found if the studies were based on the entire population enrolled in the health care plan rather than on those who visited clinics. Two studies examined patients using health care services by providing screening in the waiting room or by a physician diagnosis of depression.[10,11] The third study used a mailed questionnaire, recruited only 51% of the population of elderly subjects enrolled in a health maintenance organization (HMO), and may not be representative of the population base of elderly persons.[12]

This study used a population-based sample of 11 786 adults 60 years and older to examine whether depressed older adults have a higher use and cost of health care services than patients without depression. We also examined whether patients who met diagnostic criteria for major depression or dysthymic disorder have higher costs than those with subthreshold depressive syndromes.

METHODS

SETTING

Patients were recruited in Seattle, Wash, as part of a large, national study of quality improvement for late-life depression funded by the John A. Hartford Foundation and the California HealthCare Foundation.[15] The Seattle study site included 2 large HMO clinics. These 2 clinics are staffed by 36 board-certified family physicians and 11 nurse practitioners. These providers supply health care to a population of 53 182 patients, including 11 786 elderly patients (≥60 years of age).

RECRUITMENT

A 2-item depression screen from the Prime-MD 1000 Study[16] was sent to the population base of 11 679 elderly patients served by the 2 HMO clinics in 23 waves during an 18-month period, excluding the 107 elderly patients with depression who were referred by their physicians before mail screening. The 2-item depression screener has been found to have a sensitivity of 86% and specificity of 75% when compared with an interview-based diagnosis of major depression by mental health professionals.[16] As described in the **Figure**, of the 11 679 patients who were mailed screeners, 199 refused to participate, 2586 were nonresponders, 7265 had negative screening results on both items, and 1629 had positive screening results on at least 1 of the 2 depression screening questions. For the patients who had positive findings on the 2-item screener (n = 1629) or who were referred by their primary care physician (n = 107), a research assistant attempted to telephone the patients and schedule an in-person appointment at their primary care clinic to complete a second-stage interview, which included the Structured Clinical Interview for *DSM-IV* (SCID)[17] to determine whether subjects met research diagnostic criteria for major depression or dysthymic disorder. The Figure shows that among the 1629 elderly patients with positive screening results and the 107 referred by their physicians, 306 also met *DSM-IV* criteria for 1 or both of these affective disorders, 720 did not meet *DSM-IV* criteria for major depression or dysthymia, and 710 never received the SCID. Of the 720 patients with positive screening results but negative SCID findings for major depression or dysthymia, 10.2% met criteria for minor depression (2-4 *DSM-IV* major depressive symptoms present for ≥2 weeks with depressed mood or anhedonia). Reasons for not receiving the SCID included refusal (n = 268); the patient could not be located or the primary care physician thought the patient was inappropriate for study (n = 86); the patient met 1 of the ineligibility criteria (eg, planned to disenroll, lack of transportation to clinic, or hearing impairment) at prescreening (n = 200); and study recruitment had ended (n = 156). A total of 271 of the 306 patients meeting *DSM-IV* criteria for major depression and/or dysthymia were enrolled in a randomized controlled trial.

In this study, 4 groups of patients were compared by costs, including those with negative screening results (screen-negative group; n = 7265); those with positive screening results and negative SCID findings (screen-positive SCID-negative group; n = 720); those with positive screening results and SCID findings (screen-positive SCID-positive group; n = 306); and those with positive screening results who never received the SCID (screen-positive no-SCID group; n = 710).

STUDY MEASURES

Baseline interviews were conducted by trained lay interviewers using structured computerized interviews. Patients were paid $25 for their time in completing the baseline interview. Baseline interviews assessed age, sex, marital status, employment status, ethnicity, and level of education. Psychiatric diagnoses were ascertained by using the SCID sections on dysthymia and major depression.[17]

Research assistants and the telephone survey team were trained in the use of the SCID in a 2½-day in-person training workshop at the coordinating center at the University of California–Los Angeles. Training included didactics, watching videotapes of the SCID, and role-playing. Interviewers were carefully trained in how to judge whether symptoms of sleep disturbance, change in weight or appetite, feeling slowed down or speeded up, loss of energy, and loss of concentration were due to a medical disorder, medication, or depression. Training involved multiple clinical examples, role plays, and individual feedback by a clinician when there was a question from an interview. All interviewers had to demonstrate proficiency with a certification interview. All interviews were edited at the university, and feedback on interview problems was provided individually and during monthly telephone conference calls during the study.

We controlled for severity of medical illness using a modified version of the Chronic Disease Score-II (CDS-II) that excluded psychotropic medications in the estimation of overall disease severity.[18] The CDS-II is a measure of chronic medical illness derived from the computerized refill records of the Group

Table 1. Demographics by Depression Groups*

	Depression Groups			
	Screen-Negative (n = 7265)	Screen-Positive SCID-Negative (n = 720)	Screen-Positive SCID-Positive (n = 306)	Screen-Positive No-SCID (n = 710)
Age, mean (SD), y†	72.9 (8.3)	73.0 (8.3)	73.7 (7.9)	74.9 (9.4)
Chronic Disease Score, mean (SD)‡	2246.3 (1741.0)	2770.3 (2462.1)	2900.3 (2775.6)	2911.4 (2683.5)
% Women§	56.4	61.7	63.7	63.1

Abbreviation: SCID, Structured Clinical Interview for *DSM-IV*.
*Groups are described in the "Recruitment" subsection of the "Methods" section.
†$F_{3,8997} = 12.87$; $P<.001$.
‡$F_{3,8773} = 44.82$; $P<.001$.
§$\chi^2_3 = 22.50$; $P<.001$.

Health Cooperative (GHC) of the patients' use of prescription medications during a 6-month period.[18] The CDS-II has been found to predict as much of the variance in primary care visits, outpatient costs, and total costs as the ambulatory diagnostic groups.[19]

Health care plan computerized data were used to identify all health care services provided or paid for by GHC during the 6 months before screening. This included outpatient services for general medical or mental health care, inpatient medical and mental health services, pharmacy costs, and other health care services paid for by GHC. All GHC outpatient and inpatient services were assigned costs on the basis of health care plan accounting records (including actual personnel, supply, and overhead costs). Services purchased by GHC from external providers were assigned costs equal to the amount reimbursed by GHC.

STATISTICAL ANALYSIS

To assess the representativeness of our sample, we compared individuals who underwent screening with nonrespondents on age, CDS-II, ambulatory medical costs, and inpatient medical costs using unpaired 2-tailed *t* tests and on sex using a χ^2 analysis with a correction for continuity. We also compared the 4 depression groups on age, sex, and CDS-II using analyses of variance and a χ^2 analysis with a correction for continuity. For descriptive purposes, the average costs for the 6-month period before screening within cost categories and 95% confidence intervals (CIs) were determined for the depression groups on the basis of unadjusted dollar amounts.

Given the heterogeneity of cost data and the proportion of patients with no health care costs, we used a 2-part model to determine whether health care costs varied as a function of depression screening group status.[20] In particular, we were interested in the total health care costs (inpatient and outpatient) and total outpatient costs categorized further as depression and nondepression treatment outpatient costs. In the first part of the analysis, logistic regressions were used to obtain odds ratios (ORs) of the probability for having any health care costs in the 4 categories described herein. Patients in the depression groups were compared with the screen-negative group. Age, sex, and CDS-II were used as covariates. In the second part of the model, the cost data were log-transformed due to their extreme skewness to the right and to meet the requirements of ordinary least squares regression. The dependent variables were the 4 log-transformed health care cost sources. The independent variables were depression groups, which were represented in the models as 3 dummy variables and used the screen-negative group as the reference group. Age, sex, and CDS-II were used as covariates. Only patients with costs in a given category were used in the corresponding analysis. We performed tests for heteroscedasticity of the log-transformed data between the depression groups.[21] Cost ratios of estimated median health care costs between the reference group and the 3 depression groups were calculated by exponentiating the regression coefficients for each dummy variable. We also calculated 95% CIs for the ratios. Additional cost ratios were generated using the major depression and/or dysthymia group as the reference group to test cost differences among the 3 depression groups.

RESULTS

The nonresponders who never sent back the screen were similar to the responders who returned the screen in sex ($\chi^2_1=0.53$) and CDS-II ($t_{11566}=0.17$), but differed in age by 1 year (mean±SD age of responders, 73.4±8.5 years; mean±SD age of nonresponders, 72.4±9.5 years; $t_{12061}=4.83$; $P<.001$). In terms of cost data, responders had similar 6-month ambulatory medical costs to the nonresponders ($t_{11570}=0.74$), but had significantly lower mean inpatient costs during that period ($536 vs $902; $t_{11570}=3.48$; $P<.001$). On further analysis, this difference in inpatient costs was due to a larger percentage of patients in the nonresponder group being hospitalized (15.6%) compared with the group undergoing screening (11.8%) ($\chi^2_1=24.1$; $P<.001$). However, there was no significant difference in the average cost of inpatient care for those who were hospitalized in the 6-month period ($t_{1459}=1.90$).

The demographics of 4 depression groups can be seen in **Table 1**. The screen-negative group was younger, healthier, and more likely to be male than the other depression groups. All 3 screen-positive depression groups were fairly similar in demographics.

UNADJUSTED COSTS BY GROUP

Table 2 contains the unadjusted health care costs stratified by source for the depression groups. About 95% of the 9001 patients (n=8569) had some health care costs, including all inpatient and outpatient sources. As expected, costs tend to be higher for the 3 depression groups in all components of mental health care, including antidepressant prescriptions, specialty mental health care visits, and primary care visits with a mental health diagnosis. However, a trend for increased costs is seen for the 3 depression groups in all outpatient nonmental health categories, including primary care, specialty medical and emergency department visits, prescriptions, and other outpatient visits.

Table 2. Unadjusted Health Care Costs by Depression Screening Groups for the 6 Months Before Screening*

Source of Cost	Depression Groups, Mean (95% CI), $†			
	Screen-Negative (n = 7265)	Screen-Positive SCID-Negative (n = 720)	Screen-Positive SCID-Positive (n = 306)	Screen-Positive No-SCID (n = 710)
Antidepressant prescriptions	12 (11-14)	46 (37-54)	61 (47-76)	54 (43-64)
Specialty MH care visits	9 (7-12)	40 (25-55)	37 (21-54)	39 (22-56)
Primary care visits with MH diagnosis	10 (9-11)	38 (31-45)	39 (29-50)	34 (27-41)
Outpatient depression treatment costs	**32 (28-35)**	**124 (102-146)**	**138 (109-167)**	**127 (103-152)**
Primary care visits without MH diagnosis	305 (293-317)	451 (401-501)	397 (346-447)	411 (363-458)
Diagnostic tests (laboratory and radiology)	171 (162-180)	295 (254-337)	227 (186-268)	291 (239-343)
Specialty medical visits	302 (288-316)	521 (448-593)	430 (357-504)	491 (429-554)
Emergency department visits	35 (30-40)	72 (52-93)	58 (36-80)	113 (72-155)
Pharmacy not including antidepressants	257 (246-268)	382 (344-421)	419 (347-490)	389 (352-427)
Other outpatient costs	313 (281-345)	430 (310-549)	509 (344-674)	572 (433-711)
Total outpatient nondepression costs	**1383 (1332-1435)**	**2151 (1940-2362)**	**2040 (1754-2326)**	**2267 (2025-2509)**
Total outpatient costs	**1415 (1363-1467)**	**2274 (2062-2488)**	**2178 (1887-2469)**	**2394 (2419-2641)**
Inpatient care (medical and MH)	464 (379-548)	671 (408-935)	741 (411-1072)	1054 (647-1462)
Long-term care	75 (50-101)	53 (2-108)	193 (59-327)	204 (102-307)
Total health services costs	**1954 (1835-2073)**	**2999 (2617-3380)**	**3113 (2545-3680)**	**3654 (3064-4244)**

Abbreviations: CI, confidence interval; MH, mental health; SCID, Structured Clinical Interview for *DSM-IV*.
*Boldface type indicates key total costs in specific categories.
†Groups are described in the "Recruitment" subsection of the "Methods" section.

RESULTS OF LOGISTIC REGRESSIONS PREDICTING ANY HEALTH CARE USE

The odds of having any health care costs were significantly related to the depression groups (Wald t_3=10.38; P=.02). The only OR that was statistically significant was between the screen-negative group and the screen-positive SCID-negative group (OR, 2.89; 95% CI, 1.46-5.73) in which 95% and 99% of the patients, respectively, had some amount of total health care costs (sum of outpatient and inpatient costs). The analyses predicting outpatient costs were identical to those predicting total health care costs because all of those who had no outpatient costs also had no inpatient costs. The odds of having depression treatment costs were significantly related to depression group status (Wald t_3=408.44; P<.001). All the depression groups had significantly greater odds of outpatient depression treatment costs compared with the nondepressed screen-negative group, ie, the subthreshold depressive symptoms group (screen-positive SCID-negative group [OR, 3.35; 95% CI, 2.83-3.96]), the major depression/dysthymia group (screen-positive SCID-positive group [OR, 4.49; 95% CI, 3.53-5.71]), and the screen-positive no-SCID group (OR, 3.08; 95% CI, 2.59-3.66]). A total of 15% of the screen-negative group had some depression treatment-related costs compared with 39% of the screen-positive SCID-negative group, 45% of the screen-positive SCID-positive group, and 37% of the screen-positive no-SCID group. The odds of having any nondepression outpatient costs were significantly related to the depression groups (Wald t_3=8.38; P=.04). Ninety-five percent of the nondepressed (screen-negative) group had used nondepression-related ambulatory services compared with 99% of the subthreshold (screen-positive SCID-negative) group (OR, 2.45; 95% CI, 1.31-4.57). This difference in nondepression outpatient costs between the screen-negative and screen-positive SCID-negative groups was the only statistically significant difference among the 4 groups.

ADJUSTED COST RATIOS AMONG HEALTH CARE USERS

Table 3 presents the adjusted cost ratios that describe median health care costs, adjusted for age, sex, and CDS-II. We observed no statistically significant heteroscedasticity that may have invalidated our analyses. For all cost sources, the screen-negative group had significantly lower costs than the depression groups. For total health care, the costs were from 47% to 51% higher in the depression groups. For outpatient costs as a whole, the results were 43% to 52% higher for those in the screen-positive groups. The depression treatment costs ran from 63% to 86% higher, whereas the nondepression outpatient costs ran from 34% to 43% higher. The total health care costs for the group with major depression and/or dysthymia were not significantly different from those for the screen-positive SCID-negative group (adjusted cost ratio, 1.01; 95% CI, 0.85-1.20) or the screen-positive no-SCID group (adjusted cost ratio, 0.99; 95% CI, 0.83-1.17). The total ambulatory care costs for the group with major depression and/or dysthymia were also not significantly different from the screen-positive SCID-negative group (adjusted cost ratio, 1.03; 95% CI, 0.88-1.21) or the screen-positive no-SCID group (adjusted cost ratio, 0.97; 95% CI, 0.83-1.14).

COMMENT

We found that the average total health care costs were $1045 to $1700 higher and the average total ambulatory costs were $763 to $979 higher in the depressed groups compared with the controls without depression during the 6-month period. These estimates are likely conservative

Table 3. Adjusted Cost Ratios of 6-Month Median Health Care Costs by Depression Groups*

Source of Cost	Depression Group Comparisons Relative to Screen-Negative Group (n = 7265)		
	Screen-Positive SCID-Negative† (n = 720)	Screen-Positive SCID-Positive (n = 306)	Screen-Positive No-SCID (n = 710)
Total	1.51 (1.39-1.66)	1.49 (1.28-1.72)	1.47 (1.33-1.62)
Total outpatient	1.52 (1.39-1.67)	1.47 (1.36-1.56)	1.43 (1.30-1.56)
Outpatient depression	1.63 (1.37-1.93)	1.78 (1.42-2.24)	1.86 (1.56-2.22)
Outpatient nondepression	1.43 (1.30-1.57)	1.36 (1.18-1.56)	1.34 (1.22-1.47)

Abbreviations: CI, confidence interval; SCID, Structured Clinical Interview for *DSM-IV*.
*Adjusted for sex, age, and chronic disease score. Groups are described in the "Recruitment" subsection of the "Methods" section. Data are expressed as cost ratio (95% CI).
†Indicates all cost ratios were significant at $P<.001$.

because approximately 15% of the nondepressed sample had depression treatment–related costs and may have had higher health care costs associated with depression that was successfully treated or spontaneously remitted at the time of our survey. Costs tended to be higher in every category examined (primary care visits with and without a mental health diagnosis, diagnostic tests, specialty medical visits, emergency department visits, pharmacy costs [including antidepressant and nonantidepressant prescriptions], and other outpatients costs and mental health care visits). This increase in costs in every component of care has also been described in previous studies.[10-12] After controlling for demographic factors and medical comorbidity, older adults with subthreshold symptoms or those with major depression had total outpatient costs that were approximately 43% to 52% higher and total health care costs that were 47% to 51% higher than those of nondepressed elderly patients.

The increase in total medical costs in every component of costs in elderly patients with depression may be due to the tendency of depressed patients to amplify medical symptoms.[6,22] Multiple studies have shown that patients with depression have a marked increase in medically unexplained physical symptoms such as headache and abdominal pain.[6,22] Also, studies of patients with diabetes mellitus,[23] hepatitis C virus infection,[24] inflammatory bowel disease,[25] and closed head injury[26] have shown that patients with comorbid depression and 1 of these illnesses have significantly more somatic complaints and functional impairment than patients with the medical illness alone, even after controlling for severity of medical illness. This increase in medical symptoms in depressed elderly patients may lead to more medical investigations and prescriptions aimed at reducing these symptoms.

Medical disorders that are associated with aversive symptoms and functional impairment have also been found to be associated with higher prevalence rates of major depression.[27] Depression has been found in patients with medical comorbidity to be associated with a 3-fold higher rate of nonadherence to medical regimens.[28] This adverse effect of depression on self-care regimens (diet, exercise, and use of medications) may worsen the course of medical illness and lead to higher medical costs.[29] Depression may also worsen the course of medical illness by direct biological mechanisms such as changes in hypothalamic-pituitary-adrenal axis and the sympathetic nervous and immunologic systems.[30]

The finding that 15% of our nondepressed patients had been exposed to depression treatment within the past 6 months probably reflects the international trend for increased treatment of depression.[31-33] Recent studies have demonstrated that in 1997, 11.5% of the elderly population and 17.2% of women in the oldest age group in Toronto, Ontario, were receiving an antidepressant.[31] A second study reported that 14.3% of elderly white individuals in the Piedmont region of North Carolina were found to be receiving an antidepressant in 1997.[32] Olfson and colleagues[33] have also described a marked increased exposure to antidepressant medication during the past decade. About half of the 15% of nondepressed subjects in the current study met criteria for depression treatment on the basis of antidepressant prescription only (ie, no current *International Classification of Diseases, Ninth Revision* codes for depression diagnosis); some of these patients likely received antidepressant medication for other indications such as insomnia or pain. Despite this increase in exposure to depression treatment, only about 45% of the depressed SCID-positive group in the present study had been exposed to depression treatment in the previous 6 months, suggesting a continuing gap in quality of depression treatment.[34]

One potential limitation of our findings is that we do not have data from this study on whether the 710 patients in the screen-positive no-SCID group met criteria for anxiety or other nondepressive *DSM-IV* diagnoses. However, the 2-item PRIME-MD has been shown to have as high sensitivity, specificity, and positive predictive value to the diagnosis of major depression by a mental health interviewer as other longer depressive scales.[16] The likelihood that the patients with positive findings on the PRIME-MD 2-item screen who do not meet criteria for major depressive disorder, dysthymia, or minor depression may meet criteria for an anxiety disorder was also suggested by data that this 2-item screen performed well as a general screen for all PRIME-MD mood and anxiety disorders.[16]

A potential limitation of this study is how well the measure of medical comorbidity, the CDS-II, which is based on pharmacy refills by patients, controls for differences in medical severity. All comorbidity measures including the CDS-II, ambulatory diagnostic groups (based on physician diagnosis), medical chart review methods, and a patient self-rating list of chronic medical illness are influenced by use of health care services. Since depres-

sion increases use of health care services, patients with depression may be more likely to receive medical examinations and medical diagnoses. Therefore, controlling for medical illness severity may actually conservatively bias results against finding differences in medical costs. The CDS-II has been shown to predict as much of the variance in primary care visits and outpatient costs as ambulatory diagnostic groups, but the CDS-II was a stronger predictor of mortality.[18] In previous studies, the CDS was also shown to be highly correlated with physician ratings of severity of illness.[18] Finally, in capitated plans like GHC, pharmacy data are readily available and may be of higher quality than diagnostic data because capitated environments have less incentive to report diagnostic and procedural data than health care systems where these data are necessary for reimbursement.[18]

Although we observed significant differences in health care costs between older adults with or without positive screening results for depression, we did not find that those who met diagnostic criteria for major depression or dysthymia had significantly higher costs than participants in the screen-positive group who did not meet diagnostic criteria for major depression or dysthymic disorder. Some depressed patients may have recently experienced a partial response to antidepressant treatment and, thus, no longer met diagnostic criteria for a depressive disorder but still incurred the increased costs of health care associated with depression in the 6 months leading up to study enrollment. Studies have also shown that patients with subthreshold depressive symptoms have more medically unexplained physical symptoms (eg, headache and gastrointestinal symptoms)[6] and more functional impairment[7,8] than nondepressed patients, even after controlling for medical illness comorbidity, and these symptoms and problems with function may be associated with the observed increased use of medical services and costs.

In the 3 depression groups, a mean of only $124 to $138 of the approximately $2000 in total ambulatory costs or $3000 in the total health services costs (outpatient and inpatient) were outpatient depression treatment costs. The low amount of costs for depression treatment suggest that there may be a lack of effective diagnosis and application of evidence-based antidepressant treatment in depressed older adults that may contribute to higher use of other health care services. Older adults may be reticent to seek care for depression owing to stigma or acceptance of depression as a "normal" reaction to life circumstances, and physicians may also not be accurately diagnosing depression.[13,14]

The strengths of this study include the large population-based sampling of patients enrolled in a health care plan and the use of a screening tool and a structured psychiatric interview. Approximately 76% of elderly patient responded to the initial mailed depression screen, and nonresponders did not differ from responders on sex, degree of chronic medical illness, or ambulatory costs in the previous 6 months, but were slightly younger and more likely to be hospitalized in the previous 6-month period. Limitations include the sampling at 1 geographic site that tends to have a higher proportion of white population and higher incomes than some regions in the United States. However, our findings of increased total medical costs associated with depression in elderly patients are quite similar to data reported by Callahan and colleagues,[10] who studied an urban, inner-city, poor population in Indianapolis, Ind, with a high proportion of African American patients.

CONCLUSIONS

Results from this population-based study clearly confirm that elderly patients with depression use more medical services of all types compared with their nondepressed counterparts. A key question that arises from these data is whether improved screening, combined with systematic changes in primary care to improve disease management of depression by substituting efficacious, evidence-based depression treatments for the high use of less specific medical services would be more cost-effective than care as usual. Several recent multicenter trials, including the IMPACT (Improving Mood-Promoting Access to Collaborative Treatment)[15] and PROSPECT (Prevention of Suicide in Primary Care Elderly–Collaborative Trial)[35] studies, should provide an answer to this question in the coming years.

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REFERENCES

1. Lyness J, Caine E, King D, Cox C, Yoediono Z. Psychiatric disorders in older primary care patients. *J Gen Intern Med.* 1999;14:249-254.
2. Barry K, Fleming M, Maxwell L, Copeland L, Appel S. Prevalence of and factors associated with current and lifetime depression in older adult primary care patients. *Fam Med.* 1998;30:366-371.
3. Angst J. Epidemiology of depression. *Psychopharmacology (Berl).* 1992;106 (suppl):S71-S74.
4. Oxman T, Barret J, Barret J, Gerber P. Symptomatology of late-life minor depression among primary care patients. *Psychosomatics.* 1990;31:174-180.
5. Lyness J, King D, Cox C, Yoediono Z, Caine E. The importance of subsyndromal depression in older primary care patients: prevalence and associated functional disability. *J Am Geriatr Soc.* 1999;47:757-758.
6. Waxman H, McCreary G, Wennrit R, Carner G. A comparison of somatic complaints among depressed and non-depressed older persons. *Gerontologist.* 1985; 25:501-507.
7. Beekman A, Deeg D, Braam A, Smith J, Von Tilburg W. Consequences of major and minor depression in later life: a study of disability, well-being and service utilization. *Psychol Med.* 1997;27:1397-1409.
8. Unützer J, Patrick D, Diehr P, Simon G, Grembowski D, Katon W. Quality adjusted life years in older adults with depressive symptoms and chronic medical disorders. *Int Psychogeriatr.* 2000;12:15-33.
9. Radloff L. The CES-D Scale: a self-report symptom scale for research in the general population. *Appl Psychol Meas.* 1997;1:385-401.
10. Callahan C, Hui S, Nienaber N, Musick B, Tierney W. Longitudinal study of depression and health services use among elderly primary care patients. *J Am Geriatr Soc.* 1994;42:833-838.
11. Unützer J, Patrick D, Simon G, Grembowski D, Walker E, Rutter C, Katon W. Depressive symptoms and the cost of health services in HMO patients aged 65 years and older: a 4-year prospective study. *JAMA.* 1997;277:1618-1623.

12. Luber P, Meyers B, Williams-Russo P, Hollenberg JP, DiDomenico TN, Charlson ME, Alexopoulos GS. Depression and service utilization in elderly primary care patients. *Am J Geriatr Psychiatry*. 2001;9:169-176.
13. O'Connor D, Rosewarne R, Bruce A. Depression in primary care, I: elderly patients' disclosure of depressive symptoms to their doctors. *Int Psychogeriatr*. 2001;13:359-365.
14. Unützer J, Katon W, Sullivan M, Miranda J. Treating depressed older adults in primary care: narrowing the gap between efficacy and effectiveness. *Milbank Q*. 1999;77:225-256.
15. Unützer J, Katon W, Williams J Jr, Callahan CM, Harpole L, Hunkeler EM, Hoffing M, Arean P, Hegel MT, Schoenbaum M, Oishi SM, Langston CA. Improving primary care for depression in late life: the design of a randomized trial. *Med Care*. 2001;39:785-799.
16. Spitzer R, Williams J, Kroenke K, Linzer M, deGruy FV III, Hahn SR, Brody D, Johnson JG. Utility of a new procedure for diagnosing mental disorders in primary care: the Prime-MD 1000 Study. *JAMA*. 1994;272:1749-1756.
17. Williams J, Gibbon M, First M, Spitzer R, Davies M, Borus J, Howes M, Kane J, Pope H, Rounsaville B, Wittchen H. The Structured Clinical Interview for *DSM-III-R*, II: multisite test-retest reliability. *Arch Gen Psychiatry*. 1992;49:630-636.
18. Clark D, VonKorff M, Saunders K, Baluch W, Simon G. A chronic disease score with empirically derived weights. *Med Care*. 1995;33:783-795.
19. Weiner J, Starfield B, Steinwachs D, Mumford LM. Development and application of a population-based oriented measure of ambulatory care case-mix. *Med Care*. 1991;29:452-472.
20. Diehr P, Yanez D, Ash A, Hornbrook M, Lin D. Methods for analyzing health care utilization and costs. *Annu Rev Public Health*. 1999;20:125-144.
21. Manning W. The logged dependent variable heteroscedasticity and the retransformation problem. *J Health Econ*. 1998;17:283-295.
22. Katon W, Sullivan M, Walker E. Medical symptoms without identified pathology: relationship to psychiatric disorders, childhood and adult trauma, and personality traits. *Ann Intern Med*. 2001;134:917-925.
23. Ciechanowski P, Katon W, Russo J, Hirsch I. The relationship of depression symptoms to symptom reporting, self-care and glucose control in diabetes. *Gen Hosp Psychiatry*. In press.
24. Dwight M, Kowdley K, Russo J, Ciechanowski P. Fatigue, depression and functional disability in patients with chronic hepatitis C. *J Psychosom Res*. 2000;49:311-317.
25. Walker EA, Gelfand MD, Gelfand AN, Creed F, Katon WJ. The relationship of current psychiatric disorder to functional disability and distress in patients with inflammatory bowel disease. *Gen Hosp Psychiatry*. 1996;18:220-229.
26. Fann JR, Katon WJ, Uomoto JM, Esselman PC. Psychiatric disorders and functional disability in outpatients with traumatic brain injuries. *Am J Psychiatry*. 1995;152:1493-1499.
27. Katon W. Clinical and health services relationships between major depression, depressive symptoms, and general medical illness. *Biol Psychiatry*. In press.
28. Dimatteo M, Lepper H, Croghan T. Depression is a risk factor for noncompliance with medical treatment: meta-analysis of the effects of anxiety and depression in patient adherence. *Arch Intern Med*. 2000;160:2101-2107.
29. Ciechanowski P, Katon W, Russo J. Depression and diabetes: impact of depression on adherence, function and costs. *Arch Intern Med*. 2000;160:3278-3285.
30. Chrousos G. The role of stress and the hypothalamic-pituatary-adrenal axis in the pathogenesis of the metabolic syndrome: neuroendocrine and target tissue-related causes. *Int J Obes Relat Metab Disord*. 2000;24(suppl 2):S50-S55.
31. Mamdani M, Hermann N, Austin P. Prevalence of antidepressant use among older people: population-based observations. *J Am Geriatr Soc*. 1999;47:1350-1353.
32. Blazer DG, Hybels CF, Simonsick EM, Hanlon JT. Marked differences in antidepressant use by race in an elderly community sample: 1986-1996. *Am J Psychiatry*. 2000;157:1089-1094.
33. Olfson M, Marcus S, Druss B, Elinson L, Tanidian T, Pincus H. National trends in the outpatient treatment of depression. *JAMA*. 2002;287:203-209.
34. Unutzer J, Katon W, Callahan CM, Williams JW Jr, Hunkeler E, Harpole L, Hoffing M, Della Penna RD, Hitchcock Noël P, Lin EHB, Areán PA, Hegel MT, Tang L, Belin TR, Oishi S, Langston C, for the IMPACT Investigators. Collaborative care management of late-life depression in the primary care setting: a randomized controlled trial. *JAMA*. 2002;288:2836-2845.
35. Mulsant B, Alexopoulos G, Reynolds C III, Katz IR, Abrams R, Oslin D, Schulberg HC, PROSPECT Study Group. Pharmacological treatment of depression in depressed older primary care patients: the PROSPECT algorithm. *Int J Geriatr Psychiatry*. 2001;16:585-592.

Correction

Error in Text. In the Art and Images in Psychiatry article titled "*The Obsession of Envy (Monomanie de l'envie)*," published in the August issue of the ARCHIVES (2003;60:764), the second sentence in the last paragraph of the article should have read as follows: "If a discrete part of the mind could be diseased while others were not, the mind was not 'spiritual ether'[5(p388)] but was localized in regions of the brain, supporting a brain-based, materialistic view of mental illness." The published text substituted the word "either" for the word "ether." We regret the error.