Major Depressive Disorder, Somatic Pain, and Health Care Costs in an Urban Primary Care Practice

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Objective: To evaluate the extent to which pain severity contributes to the increased medical care costs associated with depression in primary care.

Method: A systematic sample of primary care patients (N = 1028) from an urban practice were assessed between April 1, 2002, and January 16, 2003, with the DSM-IV Primary Care Evaluation of Mental Disorders Patient Health Questionnaire, the Sheehan Disability Scale, a medical illness checklist, and the Medical Outcomes Study 12-Item Short Form Health Survey, which includes a measure of pain interference with daily activities. Medical charges for inpatient, outpatient, and emergency department services were assessed for the 6-month periods preceding and following the index medical visit. Patients with and without major depressive disorder (MDD) were first compared with respect to clinical characteristics and median medical charges. Mean predicted medical care charges were then compared among 4 patient groups: (1) No MDD/Low Pain Interference, (2) No MDD/High Pain Interference, (3) MDD/Low Pain Interference, and (4) MDD/High Pain Interference.

Results: As compared to patients without MDD (N = 821), those with MDD (N = 207) had significantly higher predicted mean medical care charges ($19,838 vs. $6268; t = 3.3, p = .001) after controlling for age and gender and were significantly more likely to report at least moderate pain-related interference in daily activities (MDD: 69.1% vs. no MDD: 38.6%; χ^2 = 61.3, df = 1, p < .0001). Mean predicted medical care charges of patients with MDD and at least moderate pain-related interference were on average 2.33 times (95% CI = 1.34 to 4.05) as high as those for patients with MDD and little or no pain-related interference. Among patients with at least moderate pain-related interference, MDD was associated with significantly greater mean predicted charges (mean = $28,598/year with MDD vs. $11,031/year without MDD). However, among patients with lower levels of pain-related interference, MDD was not associated with greater mean predicted medical charges (mean = $2306/year with MDD vs. $3560/year without MDD).

Conclusion: In this urban primary care practice, major depressive disorder is associated with increased health care costs, but only among patients with moderate to extreme pain-related interference in daily activities.

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The economic burden that depression imposes on the health care system includes direct treatment costs and costs related to increased medical service use.[1,2] In one mental health organization, for example, primary care patients with depression had annual health care costs that were nearly twice those of patients without depression.[3] The increased service utilization and costs occur across pharmacy, laboratory, general medical care, and specialty care[3] and have been observed in publicly[4] and privately[5] financed patient populations.

Some of the increase in medical care costs associated with depression may be explained by well-defined comorbid medical conditions or depression-related problems in self-care or adherence with medical treatments. Among persons with diabetes, for example, comorbid depression is associated with worse outcomes due to inadequate glucose regulation.[6] Depression may also complicate the course of coronary artery disease[7] and arthritis.[8] However, comorbid medical illness does not appear to fully account for the elevated medical care costs of patients with depression. For example, a study of older primary care patients found that even after adjusting for chronic medical illness, total ambulatory and inpatient general medical care costs were approximately 50% higher for depressed than nondepressed patients.[9]

Some of this unexplained increase in medical care costs associated with depression may be explained by the close association between depression and pain. Pain, which often has an unknown etiology, frequently occurs in patients with depression.[10–12] Depression is an important risk factor for the development of several pain syndromes.[10,13,14] In one longitudinal study, depressive symptoms predicted development of low back pain, neck-shoulder pain, and musculoskeletal symptoms.[13] Depression may also amplify existing pain symptoms by

decreasing the ability of individuals to habituate to pain.[9] Patients with pain syndromes are also at substantially increased risk of developing depression.[15] The risks of developing depression appear to increase with the severity,[16–18] frequency,[19] duration,[20] and number[21] of pain symptoms. Thus, complex and sometimes reciprocal relationships exist between depression and pain.

In the current report, we assess the extent to which severity of pain-related interference in daily activities contributes to the increased medical care costs associated with depression in primary care. If the severity of pain-related interference in daily activities makes a substantial contribution to health care costs of depression, it would have important pharmacoeconomic implications for the treatment of comorbid depression and pain in primary care.

METHOD

The study was conducted between April 1, 2002, and January 16, 2003, at the Associates in Internal Medicine (AIM) practice of New York–Presbyterian Hospital (Columbia University Medical Center) in New York City. AIM is the faculty and resident group practice of the Division of General Medicine at the College of Physicians and Surgeons of Columbia University. AIM provides primary care to approximately 18,000 adult patients from the surrounding northern Manhattan community each year. This urban community includes predominantly low-income immigrants from the Dominican Republic with a high level of unemployment. The practice is limited to privately and publicly insured patients and is supported through third-party reimbursement.

The Institutional Review Boards of the Columbia-Presbyterian Medical Center and the New York State Psychiatric Institute approved the study protocol, including the Spanish translation of survey forms. All participants provided informed consent.

Participant Recruitment

A systematic sample of consecutive adult patients seeking primary care presenting to the AIM practice was invited to participate. Eligible patients were aged 18 to 70 years, had made at least 1 prior visit to the practice, could speak and understand Spanish or English, and were waiting for scheduled face-to-face contact with their primary care physician. Patients were excluded from the study if their current health status prohibited completion of the survey forms.

A total of 3807 patients were approached, of whom 169 (4.4%) refused solicitation. Of the 3638 who permitted prescreening, 2291 (63.0%) were excluded because they did not meet survey eligibility criteria. The group of excluded patients (N = 2291) included patients who were excluded because they were not scheduled for face-to-face contact with a primary care physician (N = 1294),

patients who were not between 18 and 70 years old (N = 767), patients who had not made a previous visit to the practice (N = 382), and patients who were unable to complete the survey forms due to poor physical health (N = 76) or due to cognitive impairment (N = 37).

After these patients were excluded, there were 1347 who met eligibility criteria. Among this group, 1157 (85.9%) consented to participate in the mental health survey. Of the surveyed patients, 1028 (88.9%) could be linked to the Columbia-Presbyterian Medical Center database and provided sufficient information to be classified with respect to current major depressive disorder (MDD) on the DSM-IV Primary Care Evaluation of Mental Disorders (PRIME-MD) Patient Health Questionnaire (PHQ).[22]

As compared to the group with incomplete data (N = 129), the analytic sample (N = 1028) was significantly older (mean ± SD = 51.2 ± 12.2 years vs. 48.8 ± 12.0 years, t = 2.13, df = 1155, p = .03) and significantly differed with respect to health insurance coverage (χ^2 = 19.1, df = 4, p = .0007). Specifically, the analytic sample more commonly had Medicare (16.6% vs. 8.5%) and less commonly had Medicaid (75.7% vs. 79.1%) coverage than the group with incomplete data. The 2 groups did not significantly differ with respect to gender, race/ethnicity, marital status, education, or income (data not shown).

Sociodemographic and Clinical Assessment

The survey forms without validated Spanish versions were translated from English to Spanish and back-translated by a bilingual team of mental health professionals.

All participants completed a sociodemographic history form to assess age, gender, race/ethnicity, marital status, educational achievement, and annual household income. Health insurance coverage was hierarchically ordered in the following descending order: private insurance, Medicare, Medicaid, and other insurance. The PRIME-MD PHQ[22] was used to assess current symptoms of major depressive disorder, panic disorder, general anxiety disorder, and past-year alcohol use disorder. Drug use disorders were assessed with a module patterned after the PRIME-MD alcohol use disorder module.

Health functioning was evaluated with the Physical and Mental Component Summary scores of the Medical Outcomes Study 12-Item Short Form Health Survey (SF-12).[23] Interference with daily activities related to somatic pain was indexed by the following SF-12 item: "During the past 4 weeks, how much did pain interfere with your normal work (including both outside the home and housework)?" Responses are coded "not at all," "a little bit," "moderately," "quite a bit," and "extremely." In several of the analyses, the pain-related interference item is dichotomized into low pain (not at all or a little) or high pain (moderate, quite a bit, or extreme) groups.

Impairment was also evaluated with the 10-point self-rated social life and family life/home responsibilities

subscales of the Sheehan Disability Scale (0 = none, 1 to 3 = mild, 4 to 6 = moderate, 7 to 9 = marked, 10 = extreme).[24] Because only 19.8% of the study patients were gainfully employed, the work subscale of the Sheehan Disability Scale was not used. Self-report information was also collected to assess whether a physician or other health care professional had ever diagnosed the patient with any of the following medical disorders: allergies, asthma, diabetes, emphysema/bronchitis, hypertension, migraine, seizure disorder/epilepsy, obesity, or a heart attack.

Health Care Charges

For each study patient, the inpatient, emergency department, and outpatient billing records from the university medical center were reviewed for the 6-month periods preceding and following the date of study participation (index visit). Total health care charges were derived by summing across all positive charges and deducting all negative charges in the billing records.

Analytic Strategy

Patients with and without current DSM-IV/PRIME-MD MDD were first compared with respect to sociodemographic characteristics, comorbid mental disorders, the Physical and Mental Component Summaries of the SF-12, pain-related interference in daily activities, Sheehan Disability Scale score, number of lifetime medical disorders, and total health care charges. Comparisons between patient groups on categorical variables were made with the χ^2 test. For ordinal variables such as education, income, and pain-related interference, the Wilcoxon 2-sample test was used. The Student t test was used for comparisons involving continuous variables. Alpha was set at .05 (2-tailed).

A preliminary analysis revealed that the distribution of health care charges was highly skewed (skewness = 15.06, Kolmogorov-Smirnov statistic = 0.45). After applying a natural log transformation to each subject's charge value plus a constant unit to enable transformation (i.e., charges → ln[charges + 1]), the distribution of charges was more nearly normal (skewness = 0.31, Kolmogorov-Smirnov statistic = 0.06).

A series of ordinary least-squares (OLS) regression models were fit to examine the zero-order, unique, and possibly interactive effects of MDD and pain-related interference on health care charges. In these models, the outcome was the log-transformed charge variable, and the effect of each predictor was ascertained by exponentiating the parameter estimate for that predictor.[25] First, we regressed the transformed charge variable on MDD status (1 = present, 0 = absent) and level of pain interference (1 = "moderate," "quite a bit," or "extremely"; 0 = "not at all" or "a little bit") separately and then together. Next, we considered an MDD × pain-related interference interac-

tion term together with the MDD and pain-related interference variables. In the final model, we considered these terms together with relevant covariates. The interaction effect was significant in the final model (p = .036), indicating that the effect of either MDD or pain interference would not be captured by collapsing across the levels of the other variable.

We then divided the sample into 4 groups representing each possible combination of MDD (present vs. absent) and level of pain interference (high vs. low). We report the regression of the transformed charge variable on this 4-level grouping variable, controlling for age and gender. Tukey's Honestly Significant Difference test was used to maintain an alpha of .05 for the set of 6 pairwise comparisons.

We used this regression equation to calculate mean expected charges for individuals in these 4 groups. Duan's smearing technique was used to correct for the retransformation bias that occurs when exponentiating a predicted log value.[26] Typically, the exponentiated log prediction is multiplied by a smearing coefficient equal to the mean exponentiated residual (Σ exp[residual]/N) in the overall regression.[25,26] Because of the heteroscedasticity observed across the 4 groups, we applied separate smearing coefficients to each group,[27] with each coefficient equal to the mean exponentiated residual for that group in the overall regression of logged charges.

RESULTS

Characteristics of Patients
With Major Depressive Disorder

Approximately 20.1% of the sample met DSM-IV criteria for MDD. As compared with patients without MDD, patients with MDD were significantly more likely to be female, Hispanic, and separated or divorced, have less than a high school education, and have annual household incomes of less than $12,000 (Table 1). The groups also significantly differed with respect to health insurance, with patients with MDD more likely than those without MDD to have Medicaid, but less likely to have private insurance or Medicare.

Major depressive disorder was also strongly associated with comorbid disorders, physical and functional impairment, pain-related interference with daily activities, and higher total health care charges (Table 2). Specifically, as compared with patients without MDD, those with MDD were significantly more likely to meet DSM-IV/PRIME-MD criteria for a substance use disorder, generalized anxiety disorder, and panic disorder. They also had significantly more self-reported general medical illnesses than patients without MDD and significantly more impaired scores on the 2-item Sheehan Disability Scale and the SF-12 Physical and Mental Component Summaries. Whereas 69.1% of patients with MDD reported that pain

Table 1. Sociodemographic Characteristics of 1028 Adult Primary Care Patients by Major Depressive Disorder (MDD) Status

Characteristic	Patients With MDD (N = 207)	Patients Without MDD (N = 821)	Test
Age, mean (SD), y	51.7 (10.7)	51.1 (12.6)	t = 0.6, df = 1026, p = .56
Gender, %			χ^2 = 18.1, df = 1, p < .0001
Male (N = 314)	18.4	33.6	
Female (N = 714)	81.6	66.4	
Race, %			χ^2 = 8.3, df = 2, p = .016
Hispanic (N = 843)	88.4	80.4	
African American (N = 135)	7.3	14.6	
White/other (N = 50)	4.4	5.0	
Marital status, %			χ^2 = 21.7, df = 3, p < .0001
Married/cohabiting (N = 313)	21.3	32.8	
Separated/divorced (N = 441)	57.0	39.4	
Widowed (N = 77)	5.3	8.1	
Never married (N = 195)	16.4	19.7	
Education, %			z^a = 3.7, p = .0002
Up to 8th grade (N = 364)	43.4	33.9	
9th to 11th grade (N = 185)	21.5	17.4	
High school graduate (N = 238)	21.0	24.0	
Some college/technical school (N = 147)	10.7	15.4	
4 years or more of college (N = 83)	3.4	9.4	
Annual household income, %			z^a = 1.8, p = .07
Less than $6000 (N = 410)	42.4	39.9	
$6000–$11,999 (N = 354)	40.5	33.5	
$12,000–$17,999 (N = 139)	9.8	14.7	
$18,000–$35,999 (N = 79)	6.3	8.2	
$36,000 or more (N = 32)	1.0	3.7	
Insurance coverage,[b] %			χ^2 = 15.3, df = 4, p = .004
Private	1.9	6.5	
Medicare	12.6	17.7	
Medicaid	85.0	73.3	
Other insurance	0.5	1.2	
None reported	0.0	1.3	

[a]Wilcoxon 2-sample test.
[b]Categories were constructed hierarchically according to the order shown and therefore sum to 100%; however, subjects could endorse more than 1 source. Among the 1017 subjects who reported any coverage, 87.3% reported 1 source and 12.7% reported 2 sources.

interfered with their normal work at least moderately, only 38.6% of patients without MDD made a similar report (χ^2 = 61.3, df = 1, p < .0001).

For patients with MDD, observed annual health care charges were a mean of $20,419 (SD = $117,740; range = $0 to $1,333,184). For patients without MDD, observed annual health care charges were a mean of $6780 (SD = $49,519; range = $0 to $1,120,330). Median annual health care charges for patients with MDD ($2247) were significantly different from those for patients without MDD ($1429; z = 3.6, p = .0003) (Table 2). The mean of the logged charge variable was also significantly different for these 2 groups, t = 2.96, df = 1010, p = .003, adjusting for unequal variances. Controlling for age and gender, patients with MDD, as compared with those without MDD, had significantly higher predicted mean medical charges ($19,838 vs. $6268; t = 3.3, p = .001).

Among patients with MDD, predicted mean charges were 133% (95% CI = 34% to 305%) higher in the group with at least moderate pain-related interference. In the bivariate analyses, severity of pain-related interference with daily activities was directly related to health care charges. For example, the mean observed health care charges of patients who reported extreme pain-related interference ($10,554) was more than twice that of patients who reported no pain-related interference ($4041) (not shown).

Major Depressive Disorder, Pain-Related Impairment, and Health Care Charges

In regression model 1, MDD alone (β = 0.43, p = .0005) was strongly related to the log of health care charges. When pain-related interference was added as a covariate, there was a 35% (0.43 to 0.28) reduction in the β for the association between MDD and the log of health care charges. In order to test whether pain-related interference modifies the effect of MDD on health care charges, an MDD × pain-related interference interaction term was added to the model (model 4) (Table 3). In this model and in one (model 5) with several covariates, including patient demographic characteristics, Sheehan Disability Scale score, and comorbid physical and mental disorders, the interaction term remained significantly related to the log of health care charges (Table 3). Similar results were observed when the pain-related interference variable was entered into the final model as a continuous variable.

Table 2. Clinical Characteristics and Health Care Charges by MDD Status

Characteristic	Patients With MDD (N = 207)	Patients Without MDD (N = 821)	Test
SF-12 Physical Component Summary, mean (SD)[a]	36.2 (10.6)	40.8 (11.4)	t = 5.2, df = 975, p < .0001
SF-12 Mental Component Summary, mean (SD)[a]	33.4 (10.5)	49.5 (10.2)	t = 19.8, df = 975, p < .0001
Pain item from the SF-12, %[b]			z^c = 8.5, p < .0001
Not at all (N = 292)	11.3	33.3	
A little bit (N = 267)	19.6	28.1	
Moderately (N = 198)	24.0	18.4	
Quite a bit (N = 213)	37.7	16.8	
Extremely (N = 42)	7.4	3.3	
No. of lifetime medical diagnoses, mean (SD)[d]	2.6 (1.6)	2.0 (1.5)	t = 5.1, df = 985, p < .0001
Health care charges, median	$2247	$1429	z^c = 3.6, p = .0003
Drug/alcohol use disorder (PHQ), %			χ^2 = 6.9, df = 1, p = .0085
Yes (N = 83)	13.1	7.3	
No (N = 901)	86.9	92.7	
GAD (PHQ), %			χ^2 = 189.4, df = 1, p < .0001
Yes (N = 109)	37.3	4.0	
No (N = 914)	62.8	96.0	
Panic disorder (PHQ), %			χ^2 = 16.1, df = 1, p < .0001
Yes (N = 43)	9.2	2.9	
No (N = 978)	90.8	97.1	
Sheehan disability score, mean (SD)[e]	10.6 (5.3)	3.5 (4.5)	t = 18.5, df = 977, p < .0001

[a]Higher scores denote better health.
[b]16 subjects did not respond to the pain item on the SF-12.
[c]Wilcoxon 2-sample test.
[d]Sum of number of self-reported medical illnesses.
[e]Higher scores denote worse functioning.
Abbreviations: GAD = generalized anxiety disorder, MDD = major depressive disorder, PHQ = Patient Health Questionnaire,
  SF-12 = Medical Outcomes Study 12-Item Short Form Health Survey.

In that model, the MDD × pain-related interference interaction had t = 2.04 and p = .042.

A comparison of mean predicted health care charges of patients with and without MDD by level of pain-related interference revealed that in patients with little or no pain interference in daily activities, mean expected charges were relatively low (less than $4000/year) and unrelated to the presence of MDD. Those with at least moderate pain generally had higher expected charges than those with little or no pain-related interference in daily activities. Among those with at least moderate pain-related interference, the presence of MDD was associated with a significant increase in mean predicted charges (mean = $28,598/year, vs. $11,031/year for those without MDD) (Figure 1).

DISCUSSION

We report that nearly one half (45%) of adult low-income primary care patients with major depressive disorder have pain that more than moderately interferes with their daily activities. The prevalence of moderate or severe pain-related interference in daily activities in the current study is in the range (34%–59%) previously reported among depressed adult primary care patients in other studies.[17,28,29] In one controlled trial, 44% of depressed primary care patients initiating antidepressant therapy had moderate or severe pain on the SF-36 pain severity item.[30]

Bodily pain is one of the most common presenting complaints in outpatient medical practice.[31] Although pain often occurs among depressed primary care patients,[28–30] the rate of clinically significant pain has not been previously compared between primary care patients with and without depression. In relation to patients without major depressive disorder, we found that patients with major depressive disorder were roughly twice as likely to have pain that interferes more than moderately with their daily activities. This is consistent with the finding from the Medical Outcomes Study that patients with depression experience significantly more somatic pain than patients with several chronic medical illnesses (coronary artery disease, angina, diabetes, hypertension, or severe lung disease).[32]

In the current study, the median total annual health care charges of depressed patients were approximately 57% greater than those of nondepressed patients. The magnitude of this difference resembles previous reports.[2,3,5,33] For example, one study of older privately insured patients found that median health care costs of depressed patients were 47% greater than those of nondepressed patients,[3] and another study reported that mean health care costs of depressed primary care patients were 61% greater than those of their nondepressed counterparts.[2]

We found that depressed patients with at least moderate pain-related functional interference had predicted health care charges that were more than twice as large as those with lower levels of pain-related disability. This observation extends to a clinical population an association that

Table 3. Regression Model Estimates in the Prediction of
Health Care Charges[a] (N = 1028)

Models	df	β	t	p Value
Model 1				
MDD[b]	1	0.43	3.48	.0005
Model 2				
Pain[c]	1	0.50	4.92	< .0001
Model 3				
MDD	1	0.28	2.20	.03
Pain	1	0.44	4.24	< .0001
Model 4				
MDD	1	−0.05	−0.25	.80
Pain	1	0.34	2.98	.003
MDD × pain	1	0.53	1.98	.048
Model 5				
MDD	1	−0.05	−0.19	.85
Pain	1	0.24	1.83	.07
MDD × pain	1	0.61	2.11	.036
Gender (female)	1	0.16	1.27	.21
Age	1	0.01	2.85	.005
Ethnicity (Hispanic)	1	−0.08	−0.54	.59
Current alcohol or drug use disorder	1	0.11	0.49	.62
Current generalized anxiety disorder	1	0.09	0.46	.65
Current panic disorder	1	−0.04	−0.14	.89
Current Sheehan Disability Scale score	1	0.01	0.65	.52
Number of lifetime medical diagnoses	1	0.03	0.73	.47

[a]Actual dependent variable is log of health care charges (see Method section).
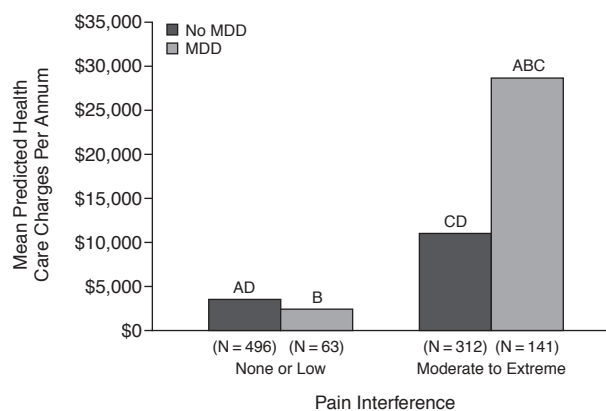[b]MDD present (vs. absent).
[c]Pain interferes "extremely," "quite a bit," or "moderately" (vs. "a little bit" or "not at all") with normal work.
Abbreviation: MDD = major depressive disorder.

Figure 1. Mean Predicted Health Care Charges of Patients With High and Low Pain Interference, by MDD Status (N = 1012)[a,b]

[a]Predicted means with the same letter are significantly different using Tukey's Honestly Significant Difference test (p < .05), controlling for age and gender.
[b]Sixteen subjects did not respond to the pain item on the SF-12.
Abbreviation: MDD = major depressive disorder.

tients. Among patients with at least moderate pain-related interference, major depressive disorder is associated with a marked increase in health care costs. However, among patients with little or no pain-related interference, major depressive disorder appears to have little effect on health care costs. The observation that pain-related interference modifies the effect of depression on health care costs suggests that substantial health care cost savings might be achieved by providing effective treatment for patients with depression and pain.[38]

Several antidepressants have known analgesic properties. A review of relevant studies concluded that tricyclic antidepressants tend to be more effective than selective serotonin reuptake inhibitors (SSRIs) for the treatment of neuropathic pain.[39] Recent research further suggests that the combined serotonin-norepinephrine reuptake inhibitors (SNRIs), duloxetine and venlafaxine, have analgesic effects in various clinical contexts. Specifically, controlled trials indicate that duloxetine reduces peripheral neuropathic pain[40] and fibromyalgia symptoms[41] and alleviates major depression and associated pain symptoms.[42,43] In addition, venlafaxine has been demonstrated to be effective in relieving pain associated with diabetic neuropathy[44] and in migraine prophylaxis.[45] Research is needed that directly compares SNRI with SSRI medications to determine the relative efficacy of these 2 antidepressant classes with respect to pain symptoms.

The current study has several limitations. First, the cross-sectional design prevented determination of temporal relationships between depression and pain-related

has been recently demonstrated in nonclinical household samples.[34,35] In one household survey of adults 50 to 60 years of age, estimated medical expenditures were higher for adults with depression and severe pain than for adults with depression and mild or moderate pain, who in turn had higher medical costs than adults with depression alone.[34] In another analysis of a nationally representative household survey that focused on adults with depression, comorbid painful health conditions were associated with a significant increase in the number of physician visits.[35]

Depression also appears to modify the effect of pain-related interference on health care costs. Among patients with moderate to severe pain-related interference, patients with major depressive disorder had predicted health care costs that were more than twice as great as those without major depressive disorder. Depression has long been hypothesized to amplify the response to pain symptoms and promote health care utilization in search of pain relief.[36,37] Because we do not have access to the temporal sequencing of the onset of pain-related interference and depression, we are not able to distinguish the effects of pain-related interference on depression from those of depression on pain-related interference with respect to health care costs.

In the current study, pain-related interference with daily activities appears to be an important determinant of the total health care costs of depressed primary care pa-

interference. Second, our measure of health care costs most likely underestimates true total health care costs because it does not capture medication costs or health services used outside of the academic medical center. However, people in this community tend to be highly dependent on the university hospital services,[46] and previous research suggests that depression affects prescription costs in a manner that is similar to its effect on other medical costs.[3] Third, billing data are a proxy for health care costs that might more accurately be assessed by counting facility, physician, nursing, pharmacy, and equipment costs.[47] We assess health care costs from the perspective of an insurer rather than the perspective of society at large. Fourth, the study excluded several patient groups, which may limit the generalizability of the findings and introduce selection biases into the estimated prevalence and clinical characteristics of major depressive disorder in this clinic. Because patients over 70 years of age were excluded, the results can not be safely extended to older adult primary care patients who have exceedingly high rates of chronic pain.[48] Fifth, the study was conducted in an urban general medical practice that serves a predominantly low-income, urban, immigrant population, and so the findings may not generalize to primary care settings that serve other socioeconomic populations. Finally, the diagnosis of major depressive disorder was based on self-report of current symptoms rather than expert-administered diagnostic interviews of clinical symptoms that would have probably yielded more accurate clinical information.

Major depressive disorder is common among adults in this urban primary care practice. The total health care charges of these patients significantly exceed those of their nondepressed counterparts, and co-occurring pain-related interference with daily activities makes an important contribution to this cost difference. Given that bodily pain and other somatic symptoms tend to impede the clinical recognition of depression,[34,49] diminish adherence to prescribed medications,[50] and compound disability,[29] the added economic burden imposed by comorbid pain-related functional interference serves to further underscore the importance of appropriately managing primary care patients with depression and somatic pain.

Drug names: duloxetine (Cymbalta), venlafaxine (Effexor).

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