

Prevalence, Burden, and Treatment of Insomnia in Primary Care

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Objective: The prevalence, burden, and management of insomnia among primary care patients were evaluated. **Method:** Consecutive patients aged 18 to 65 years in primary care clinics of a staff-model health maintenance organization (N=1,962) were screened with the 12-item General Health Questionnaire. A stratified random sample (N=373) completed face-to-face diagnostic assessments including the Composite International Diagnostic Interview, a brief self-rated disability questionnaire (Brief Disability Questionnaire), and the interviewer-rated Social Disability Schedule. A telephone follow-up survey was completed 3 months later. Use of psychotropic drugs, use of mental health services, and direct health care costs were assessed by using the health plan's automated data systems. **Results:** Approximately 10% of the primary care patients reported major current insomnia (e.g., taking at least 2 hours to fall asleep nearly every night). Current insomnia was associated with significantly greater functional impairment (according to both Brief Disability Questionnaire and Social Disability Schedule), more days of disability due to health problems, and greater general medical service utilization. While insomnia was associated with depressive disorder and chronic medical illness, adjustment for these factors only partially accounted for the association of insomnia with disability and with health care utilization. Of the patients with current insomnia, 28% received any psychotropic drug; 14% received benzodiazepines and 19% received antidepressants. **Conclusions:** Insomnia among primary care patients is associated with greater functional impairment, lost productivity, and excess health care utilization.

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Insomnia is a common complaint among community residents and primary care patients. Prevalence rates of self-reported sleep difficulty range from 10% to 40% (1-5). Epidemiologic surveys have typically shown that sleep disturbance is more prevalent among the elderly (2, 5), those with chronic medical illness (2), and those with anxiety or depressive disorders (1, 4).

Previous studies of community residents and primary care patients indicated a large burden of impairment associated with insomnia. In a survey of telecommunications employees, Kuppermann et al. (3) found that those with self-reported sleep difficulties reported poorer overall health, greater work absenteeism, and greater use of general medical services. In a report from the World Health Organization (WHO) Psychological Problems in General Health Care survey, Üstün et al.

(4) stated that insomnia among primary care patients was associated with significant increases in functional impairment and days of disability due to illness.

This study used data from the Seattle site of the WHO Psychological Problems in General Health Care study (previously described by Üstün et al. [4]) to further examine the impact and treatment of sleep disorders in primary care. We combined research interview data with the health plan's computerized records of medication use and health care utilization/cost. These analyses also used a higher threshold for diagnosis of current insomnia than that used previously (4). We used these data to address three questions: 1) What are the prevalence and clinical pattern of insomnia among primary care patients? 2) What is the burden of functional impairment and health care utilization associated with insomnia? 3) What are the current patterns of treatment for insomnia in primary care?

METHOD

Study Setting

Group Health Cooperative of Puget Sound is a staff-model health maintenance organization serving an enrolled population of approximately 390,000 in western Washington state. It provides comprehen-

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sive health care (including prescribed medications) on a capitated basis. Specialty mental health care is provided by the health plan's mental health service through physician referral or self-referral. Over 95% of the physicians providing primary care to adults are trained in family practice, and most of the remainder are trained in internal medicine. Over 90% are certified by appropriate specialty boards. Each full-time physician provides outpatient and inpatient care for a defined panel of approximately 1,600 patients. All subjects were recruited from three primary care clinics selected to represent the socioeconomic range of Seattle-area residents. The enrollment of Group Health Cooperative of Puget Sound closely resembles the Seattle-area population except for less representation of the high and low extremes of income (6). Differences between enrolled members and the U.S. population (fewer blacks, higher educational level) primarily reflect the characteristics of Seattle-area residents.

Assessments

Screening. Consecutive primary care patients aged 18 to 65 years who attended the study clinics were asked to complete the 12-item General Health Questionnaire, a brief assessment of psychological distress (7). The criteria for ineligibility included inability to speak English, acute medical illness that precluded participation, and participation in the study on a prior visit. Patients called from the waiting room before they completed the screening were also excluded.

Second-stage assessment. The screened patients were selected for further evaluation according to General Health Questionnaire scores: 10% of those scoring 2 or less, 35% of those scoring 3 or 4, and 100% of those scoring 5 or more. Interviews were conducted at the primary care clinic or in the patient's home as soon as possible after screening (typically within 7 days). After complete description of the study to the subject, written informed consent was obtained. The second-stage assessment included several measures, as follow.

The Composite International Diagnostic Interview (8) is a structured diagnostic interview developed by WHO that systematically evaluates subjects according to DSM-IV and ICD-10 diagnostic criteria.

The Brief Disability Questionnaire (9) is an 11-item self-rated disability assessment adapted from the Medical Outcomes Study disability questionnaire, short form (10). In this study we determined both the overall 11-item disability rating and a role impairment rating based on the five Brief Disability Questionnaire items assessing social and occupational role impairment (appendix 1). Each of these items is rated as absent, present "sometimes or a little," or present "moderately or definitely," yielding an overall score ranging from 0 to 10.

The Social Disability Schedule (11) is a semistructured interview assessing occupational role impairment. This interview yields a global rating of impairment ranging from 0 (no disability) to 3 (severe disability).

As reported earlier (12), formal between-center reliability assessments demonstrated overall agreement (kappa statistic) of 0.92 for diagnoses made with the Composite International Diagnostic Interview and 0.85 for Social Disability Schedule ratings.

Assessment of insomnia was based on separate items of the Composite International Diagnostic Interview concerning initial, middle, and terminal sleep disturbance. For these analyses, a diagnosis of insomnia required both the occurrence of at least one of these types of sleep disturbance nearly every night and a duration exceeding a minimum time criterion (i.e., at least 2 hours to fall asleep, lying awake at least 1 hour, waking at least 2 hours early). Specific items are shown in appendix 2. Most previous epidemiologic studies (1, 2, 4, 5) have based the diagnosis of insomnia on self-reported sleep difficulty only (e.g., "trouble falling asleep"). Consequently, specific criteria for frequency (nearly every night) and time were used in this study to provide a higher diagnostic threshold than in previous studies.

3-month follow-up assessment. Each patient completing the second-stage assessment was contacted by telephone for a follow-up assessment that included questions regarding use of outpatient medical and mental health services since the screening visit.

Utilization Data

Assessments of psychotropic drug use combined the drug use reported by the patients at the baseline assessment and data from the

health plan's computerized pharmacy database (13) for the 90 days following the screening visit. Assessment of outpatient mental health utilization was based on the health plan's visit registration database (14) for the 90 days following the screening visit (for in-plan utilization) and on patients' self-reported use of outpatient mental health services at the 3-month assessment (for out-of-plan utilization). Data on the cost of health services were drawn from the health plan's computerized accounting systems (15). Health services costs were calculated for a 6-month period beginning 3 months before the baseline assessment and ending 3 months after it.

Ratings of chronic medical morbidity were made by using the Chronic Disease Score, an assessment based on computerized pharmacy data (16, 17). In previous research (16) this measure has shown strong associations with subsequent mortality and health care utilization and has been less influenced by psychological distress than are self-report measures of medical morbidity.

Data Analysis

All analyses were performed by using SPSS software (SPSS, Inc., Chicago) except for analyses of covariance (ANCOVAs), which were performed by means of SAS software (SAS, Inc., Cary, N.C.). Diagnostic classification according to DSM-IV criteria was based on coding of data from the Composite International Diagnostic Interview by means of algorithms using criteria previously described (12, 18). The prevalence estimates (e.g., overall prevalence of insomnia, prevalence of insomnia according to level of depression) incorporate sampling weights (19) to account for the stratified sampling design. All other results (e.g., disability associated with insomnia) are based on unweighted data. Use of sampling weights in these analyses yielded nearly identical parameter estimates but required more complex variance estimation. Because use of standard parametric methods with a stratified random sample may result in underestimation of true variance (20), marginally significant results should be interpreted cautiously. The data on the cost of health services were highly skewed and showed an approximately log-normal distribution (15). Statistical comparisons of cost were based on log-transformed data.

RESULTS

Study Sample

Of the 2,592 patients approached for screening, 2,110 were eligible and 1,962 (93% of those eligible) completed the General Health Questionnaire. Of the 615 subjects identified as eligible for the second-stage assessment, 373 (61%) completed the interview. Lack of time was the primary reason given for refusal. The completers were slightly older than those who failed to complete the second-stage assessment, but the two groups did not differ significantly in gender, General Health Questionnaire score, or likelihood of receiving subsequent mental health care or a prescription for a psychotropic drug. Follow-up assessments at 3 months were completed for 347 patients (93%). The likelihood of completing the 3-month follow-up evaluation was slightly lower among the youngest patients but was not related to sex, presence of depression diagnosis at baseline, baseline score on the 28-item General Health Questionnaire, or baseline score on the overall Brief Disability Questionnaire. Because of disenrollment from the health plan, computerized records of medication use and health services costs were complete for 337 patients (90%). Both follow-up interview data and computerized data were available for 327 patients (88%).

Prevalence of Insomnia

The weighted prevalence rates were 6% for initial insomnia, 7% for middle insomnia, and 5% for late insomnia. Of the consecutive primary care patients who completed the second-stage interview, 10% reported at least one of these symptoms, 6% reported two or more, and 2% reported all three. The number of respondents with one or more insomnia complaints was 59 (the apparent discrepancy between prevalence rate and number of cases is due to the stratified sampling design). Demographic and clinical characteristics of the patients with and without one or more current insomnia symptoms are compared in table 1. Compared to the patients without current insomnia, those with insomnia were significantly less likely to be currently married and somewhat more likely to have chronic medical conditions. As expected, those with current insomnia were significantly more likely to suffer from a current depressive disorder.

Functional Impairment and Health Services Cost

Table 2 compares measures of functional impairment and health care utilization for the patients with and without current insomnia. Insomnia was associated with significantly greater impairment according to both the self-rated (Social Disability Schedule) and interviewer-rated (Brief Disability Questionnaire) disability measures. The percentage of patients rated as having moderate to severe occupational role disability on the Social Disability Schedule was 24% in the insomnia group (N=14) and 14% in the group without insomnia (N=44) (odds ratio=1.91, $\chi^2=3.57$, $df=1$, $p=0.06$). Days of restricted activity due to illness and days spent in bed because of illness were both approximately twice as common among the patients with insomnia. Mean total health services cost (all inpatient and outpatient care provided by the health plan) was approximately 60% higher in the insomnia group. This difference was not statistically significant, reflecting the highly skewed distribution of cost data. Analyses of log-transformed data (a method less influenced by high-cost outliers) in-

TABLE 1. Demographic and Clinical Characteristics of Primary Care Patients With and Without Current Insomnia^a

Characteristic	Insomnia (N=59)		No Insomnia (N=314)		Analysis		
	Mean	SD	Mean	SD	t	df	p
Age (years)	39.9	10.6	38.9	9.8	0.75	371	0.45
Chronic Disease Score (16, 17) ^b	0.98	1.89	1.51	2.41	1.75	335	0.08
	N	%	N	%	χ^2	df	p
Female	43	73	217	69	0.33	1	0.53
Employed	47	80	275	88	2.58	1	0.11
Graduated from college	39	66	207	66	0.01	1	0.99
Currently married	22	37	185	59	9.41	1	0.002
Current depressive disorder ^c					67.63 ^d	1	<0.001
Subthreshold depression	17	29	22	7			
Major depressive disorder	18	31	13	4			

^aDiagnosis of insomnia was based on items of the Composite International Diagnostic Interview concerning initial, middle, and terminal sleep disturbance. A diagnosis required occurrence of one of these three types of disturbance nearly every night and a nightly duration exceeding a specified period.

^bInsomnia, N=51; no insomnia, N=276.

^cDiagnoses were made according to DSM-IV criteria on the basis of coded data from the Composite International Diagnostic Interview.

^dMantel-Haenszel test for linear association.

TABLE 2. Functional Impairment and Health Services Cost for Primary Care Patients With and Without Insomnia^a

Variable	Insomnia (N=59)		No Insomnia (N=314)		Analysis		
	Mean	SD	Mean	SD	t	df	p
Social Disability Schedule global rating	0.91	0.79	0.58	0.74	3.12	371	0.002
Brief Disability Questionnaire role impairment rating	3.70	2.94	2.39	2.29	3.77	364	<0.001
Days of limited activity during 3-month follow-up	7.13	9.89	3.78	7.14	3.09	366	0.002
Days in bed during 3-month follow-up	2.22	3.75	1.01	2.59	3.02	367	0.003
Total health care cost for 3 months before and 3 months after screening visit (dollars) ^b							
Absolute	2,287	4,407	1,418	2,749	1.86	335	0.06
Log-transformed	6.92	1.16	6.51	1.14	2.39	335	0.02

^aMethod for diagnosing insomnia described in table 1.

^bInsomnia, N=51; no insomnia, N=276.

dicated that the costs for the insomnia group were significantly higher than the costs for those without current insomnia.

Given that the patients with insomnia had greater medical comorbidity and a higher prevalence of depression, the functional impairment and health care utilization associated with insomnia might reflect the confounding influence of chronic medical illness and/or depression. We examined this possibility by using a series of ANCOVA models comparing patients with and without insomnia after adjustment for various potential confounders. The first set of models included adjustments for age, gender, and Chronic Disease Score. The results are shown in the middle of table 3. Comparisons of the Social Disability Schedule global rating, Brief Disability Questionnaire rat-

TABLE 3. Adjusted Measures of Functional Impairment and Health Services Cost for Primary Care Patients With and Without Insomnia^a

Variable	Adjusted for Age, Gender, and Chronic Disease Score						Adjusted for Age, Gender, Chronic Disease Score, and Depression					
	Insomnia (N=51)		No Insomnia (N=276)		F Test (df=1, 322)		Insomnia (N=51)		No Insomnia (N=276)		F Test (df=1, 321)	
	Mean	SE	Mean	SE	F	p	Mean	SE	Mean	SE	F	p
Social Disability Schedule global rating	0.87	0.10	0.58	0.04	6.67	0.01	0.94	0.10	0.78	0.07	1.95	0.16
Brief Disability Questionnaire role impairment rating	3.66	0.34	2.37	0.15	12.04	0.002	3.97	0.34	3.24	0.25	3.45	0.06
Days of limited activity during 3-month follow-up	6.61	1.08	3.81	0.46	5.64	0.02	7.24	1.09	5.53	0.78	1.92	0.16
Days in bed during 3-month follow-up	2.38	0.42	1.03	0.18	8.90	0.003	2.53	0.42	1.46	0.30	5.09	0.02
Log-transformed total health care cost for 3 months before and 3 months after screening visit (dollars)	6.93	0.16	6.58	0.13	2.87	0.09	6.80	0.15	6.53	0.06	2.58	0.11

^aMethod for diagnosing insomnia described in table 1.

ing of role impairment, number of days of restricted activity, and number of days in bed were generally similar to the unadjusted values shown in table 2. In a multivariate analysis of variance (MANOVA) model combining all four disability measures, the patients with insomnia scored significantly higher on the disability measures than did the patients without insomnia (multivariate $F=4.11$, $df=4$, 313, $p=0.003$). After adjustment for age, gender, and Chronic Disease Score, the mean log-transformed cost was approximately 25% higher for the patients with insomnia, but this difference was not statistically significant.

The right side of table 3 displays comparisons adjusted for age, gender, Chronic Disease Score, and presence/absence of current major depressive disorder. In general, adjustment for depression diagnosis reduced the effect of insomnia by 25% to 50%. The differences between the patients with and without insomnia remained statistically significant ($p<0.05$) only for mean number of days spent in bed because of illness. For the other measures, the adjusted differences between the patients with and without insomnia were in the same direction but did not achieve the 0.05 level of statistical significance.

In each of these models, an interaction term (insomnia by depression) was introduced to test for differential effects of insomnia in those with and without current depression. This interaction was statistically significant ($p<0.05$) only for number of restricted-activity days, indicating that insomnia had a greater impact among those with current depression. Among the patients without current depression, the mean number of restricted-activity days was 4.0 (SD=5.8) for those with current insomnia and 3.7 (SD=7.2) for those without. Among the patients with current depression, the mean numbers of restricted-activity days were 12.9 (SD=13.0) for those with insomnia and 4.8 (SD=6.1) for those without. In a MANOVA model combining all four disability measures, the patients with and without insomnia did not differ significantly (multivariate $F=1.89$, $df=4$, 312, $p=0.11$).

Treatment

The rates of psychotropic medication use were based on the patients' self-reports at the second-stage assess-

ment and on the health plan's records of prescription fills/refills during the 90 days following the screening visit. The prevalence of benzodiazepine use (based on weighted data) was 14% among the patients with current insomnia and 1% among those without. The weighted prevalence of antidepressant use was 19% among those with current insomnia and 9% among those without. The weighted prevalence of any psychotropic drug use (either antidepressant or benzodiazepine) was 28% in the insomnia group. Most antidepressant use among those with insomnia occurred in the subgroup with current depressive disorder. The weighted prevalence of antidepressant use among those with insomnia and depression was 38%, compared to 13% among those with insomnia only.

Several clinical and demographic factors were examined as predictors of any psychotropic drug use (antidepressant or benzodiazepine) among the patients with current insomnia. Compared to those not using psychotropic drugs, the patients using either benzodiazepines or antidepressants had higher Chronic Disease Scores (mean=2.28, SD=3.07, versus mean=0.96, SD=0.97) ($t=1.98$, $df=49$, $p=0.05$), higher Social Disability Schedule global ratings (mean=1.18, SD=0.91, versus mean=0.75, SD=0.68) ($t=2.04$, $df=57$, $p=0.04$), higher Brief Disability Questionnaire disability scores (mean=4.59, SD=3.36, versus mean=3.18, SD=2.53) ($t=2.01$, $df=57$, $p=0.05$), higher log-transformed health services costs (mean=7.59 dollars, SD=1.02, versus mean=6.46, SD=1.04) ($t=3.82$, $df=49$, $p<0.001$), and more primary care visits in the 3 months before and 3 months after the screening visit (mean=8.1, SD=4.4, versus mean=3.8, SD=2.9) ($t=4.21$, $df=49$, $p<0.001$). Those using and not using psychotropic drugs did not differ significantly in mean age, proportion of women, proportion with current depression, mean Brief Disability Questionnaire role impairment score, mean number of limited-activity days, or mean number of days in bed because of illness.

Rates of use of specialty mental health services were based on the health plan's visit registration data for in-plan utilization and self-reported use of out-of-plan mental health services at the 3-month follow-up interview. The weighted prevalence of outpatient mental

health service use was 13% for those with current insomnia, and most mental health service utilization was by those with comorbid depression. The rates of use were 36% for those with both current insomnia and current major depression and 5% for those with insomnia only.

DISCUSSION

These findings confirm previous indications that insomnia is associated with greater functional impairment and health care utilization among primary care patients. The 10% prevalence rate for insomnia reported here is somewhat lower than the rates found in previous community and primary care surveys, probably reflecting the use of a higher diagnostic threshold. Our analyses required both self-reported sleep disturbance and achievement of specific criteria for frequency and time spent awake. Use of this threshold yielded lower prevalence rates but identified a large group of patients with considerable impairment due to insomnia. Previous analyses of the full Psychological Problems in General Health Care sample (4) using a less stringent threshold showed a higher overall prevalence rate and weaker associations with impairment and disability measures. Use of a less stringent threshold in the recent workplace sample reported by Kuppermann et al. (3) also yielded a higher prevalence and weaker associations with measures of disability and utilization of general medical services.

This sample allows only limited power to detect small differences in impairment or health care utilization. The possibility of type II error (failure to detect a meaningful difference) is best illustrated by the data in table 3. For example, comparison of log-transformed costs (adjusted for age, gender, and Chronic Disease Score) suggested 25% higher costs for those with current insomnia. This difference, however, was not statistically significant at the 0.05 level. Similarly, the 30% higher number of limited-activity days associated with insomnia (after adjustment for age, gender, medical comorbidity, and depression) was not statistically significant. Given the variability of cost and productivity measures, some clinically or economically significant differences might not be reliably detected in this sample.

The burden of functional impairment associated with insomnia in this sample appears as great as that due to many other psychiatric and general medical disorders. For example, both the Primary Care Evaluation of Mental Disorders (PRIME-MD) (21) and an earlier examination of the full Psychological Problems in General Health Care sample (22) showed that anxiety disorder and somatoform disorder were associated with an additional 3–4 disability days per month. This figure is comparable to our finding of approximately 3.5 days of additional disability per month associated with insomnia (table 2). The prevalence of moderate or severe occupational role disability in the patients with

insomnia (24%) is similar to that reported for patients with noncomorbid generalized anxiety disorder or somatoform disorder in the full Psychological Problems in General Health Care sample (22). In this sample, comparisons adjusted for the presence of depression (table 3) showed an excess of approximately one "bed day" per month associated with insomnia. This figure is comparable to the excess disability associated with lung disease or diabetes seen in the Medical Outcomes Study (23).

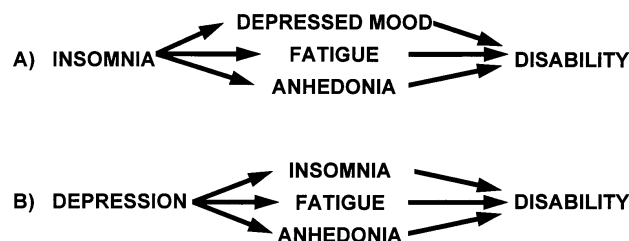
Our data do not permit detailed description or classification of sleep disorders in this sample. The Composite International Diagnostic Interview assesses symptoms of initial, middle, and late insomnia as a component of the assessment of depressive disorders. It contains no assessment of associated symptoms that might allow identification of specific sleep disorders (e.g., sleep apnea, parasomnias). As suggested by the prevalence rates presented here, the symptoms of initial, middle, and late insomnia in this sample overlapped considerably. Consequently, the number of patients with any single "pure" type was fewer than five. Exploratory analyses focused on specific insomnia types did not suggest that functional impairment or health care utilization was specifically associated with one of these insomnia patterns.

Our findings do not suggest overprescription of benzodiazepines or other hypnotic drugs to primary care patients with insomnia. The prevalence of benzodiazepine use was considerably lower than the prevalence of insomnia or anxiety disorders (24) in this sample. Approximately 15% of the patients with current insomnia received prescriptions for benzodiazepines, and fewer than 20% of those with insomnia not associated with depression were treated with antidepressants. Mellinger et al. (2) reported a similar prevalence of hypnotic use in a 1979 survey of U.S. residents. Because this sample excluded patients over age 65, the rates of benzodiazepine use reported here are underestimates of use among all adults. Previous studies in the same health plan (6) and in other community samples (2, 25) have indicated that use of benzodiazepines and other hypnotics is markedly higher for the elderly.

The relationships among insomnia, depression, and important behavioral outcomes (functional impairment and health care utilization) deserve further discussion. The data from this sample confirm earlier findings demonstrating strong associations along each side of this triangle: between insomnia and depressive disorder (1, 4), between insomnia and disability or health care utilization (3, 4), and between depression and disability (21, 22) or health care utilization (15). Attempts to disentangle these relationships encounter difficulty at both the measurement or operational level and at a more basic conceptual level.

Inclusion of insomnia among the DSM and ICD criteria for diagnosis of depressive disorder creates an association between depression and sleep disturbance by definition. This operational confounding complicates efforts to adjust for the effects of depression. For the

FIGURE 1. Alternative Linear Causal Paths Linking Insomnia, Depressive Symptoms, and Disability



analyses in this study, the patients with major depression and insomnia were required to endorse at least four additional DSM-III-R criteria for major depressive episode. The group with major depression only (no insomnia) had to endorse at least five noninsomnia criteria. Consequently, the insomnia-with-depression group included patients with smaller numbers of other (non-insomnia) depressive symptoms than did the depression-only comparison group. A similar process occurred in the stratum without current major depression; those with insomnia were constrained to have fewer other (noninsomnia) depressive symptoms than were subjects in the comparison group. This complex problem offers no simple solution. As a consequence of this measurement overlap, the stratified and adjusted comparisons reported here may suffer some negative bias (i.e., underestimate functional impairment or utilization associated with insomnia).

The overlap of depression and insomnia at the measurement level reflects overlap at the conceptual level. Use of stratified or adjusted comparisons (as in table 3) is based on the presumption that depression confounds the relationship between insomnia and functional impairment and/or health care utilization. Stated differently, this adjustment method is based on the assumption that much of the apparent association between insomnia and disability is a consequence of the true associations between each of these two factors and some confounder or "third factor" (i.e., depression). When confounding is present, stratification or adjustment allows estimation of true associations. In contrast, use of adjustment or stratification may not be appropriate when the potential causal factors of interest (e.g., depression and insomnia) lie along the same causal path (26). Adjustment for an intervening or mediating variable will introduce a negative bias. For example, some of the association between persistent pain and disability is probably mediated by depressed mood. Adjusting for level of depression (a mediating variable) would produce an underestimate of the true association between persistent pain and disability. Figure 1 illustrates two possible scenarios in which either depression or insomnia serves as a mediating variable. In situation A, the association between insomnia and functional impairment is mediated by depressive symptoms (insomnia leads to depressed mood and loss of interest, which lead to functional impairment). In situ-

ation B, insomnia is one of the factors mediating the association between depression and disability. Neither case represents confounding. It seems plausible that some of the association between insomnia and functional impairment may be mediated by depressive symptoms such as fatigue, poor concentration, and depressed mood. Consequently, the adjusted comparisons presented here may include a negative bias. The data shown on the right side of table 3 should be considered conservative estimates of the association between insomnia and functional impairment or health care utilization.

The theoretical discussion regarding the relationship between insomnia and disability eventually reduces to a pragmatic question: How (if at all) should primary care physicians intervene? Data from this and other studies suggest the potential for major improvements in quality of life and productivity if insomnia is effectively treated. Pharmacotherapy, however, may also introduce risk and cost. Epidemiologic studies demonstrate significant risks of accident and injury associated with benzodiazepines and sedating tricyclic antidepressants (27-29). The observational analyses reported here cannot, of course, determine whether interventions to improve sleep would significantly improve daily functioning or reduce unnecessary health care utilization. These data suggest, however, that insomnia and depression in primary care patients show considerable, but partial, overlap. Depression is a powerful predictor of disability and health care utilization, but insomnia appears to make an important independent contribution.

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APPENDIX 1. Role Impairment Items From the Brief Disability Questionnaire

- Have you had to cut down or stop any activity you used to do (such as hobbies) because of illness or injury?
- Have you not been able to do something that your family or household expected from you as part of daily routine?
- Have your personal problems interfered with your motivation for work?
- Have your personal problems decreased your personal efficiency at home, school, or work?
- Has there been a deterioration in your social relations with friends, workmates, or others?

APPENDIX 2. Insomnia Items From the Composite International Diagnostic Interview

Initial Insomnia

- Did you have two weeks or more when nearly every night you had trouble falling asleep?
- Did it take you at least two hours to fall asleep?

Middle Insomnia

- Did you have two weeks or more when nearly every night you had trouble staying asleep?
- Did you lie awake more than one hour?

Late Insomnia

- Did you have two weeks or more when nearly every night you had trouble with waking up too early?
- Did you wake up at least two hours before you wanted to?

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