# Overlap of Anxiety and Depression in a Managed Care Population: Prevalence and Association With Resource Utilization

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***Objective:*** To characterize the diagnosis of anxiety and depression within a large managed care population and to measure the impact of having both of these conditions on treatment patterns, health care utilization, and cost. Further, to compare the impact of having both conditions with having neither or either condition alone.

***Method:*** A retrospective, cross-sectional analysis of population-level anxiety-related and depression-related utilization over a 12-month study period was conducted. Data were from the PharMetrics Patient-Centric database, which is composed of medical and pharmaceutical claims for approximately 36 million patients from 61 health plans across the United States. Patients 18 years and older were included as cases in the analysis if they had a diagnosis of depression or anxiety during 2002. Four groups were identified based on the presence of anxiety and/or depression diagnosis: anxiety only, depression only, anxiety and depression, and controls. Controls were matched to the anxiety and depression cohort using a 4:1 ratio, based on patient age, gender, and similarity of health coverage. Cohorts were compared with respect to patient demographics, comorbid diagnoses, medication use, specialist care, utilization of health care services, and treatment costs, using both univariate and multivariate statistics.

***Results:*** Significant differences in comorbid diagnoses, medication use, health care utilization, and treatment costs existed between the study groups. Specifically, patients with both anxiety and depression tended to have more somatic complaints such as abdominal pain, malaise, or chest pain than patients with either condition alone or the control group. Antidepressant use was highest among the anxiety and depression cohort, while anxiolytic use was as prevalent in the anxiety and depression cohort as in the anxiety only cohort. Patients in the anxiety only, depression only, or anxiety plus depression groups had a higher number of anxiety- and/or depression-related visits as well as visits not related to depression or anxiety than the control group, with the anxiety and depression cohort incurring the highest utilization of medical services. Similarly, in terms of cost, the disease cohorts incurred significantly higher cost than their control counterparts, with the anxiety and depression cohort incurring higher cost than those with either condition alone, even after accounting for differences in patient characteristics.

***Conclusions:*** Combination of anxiety and depression is fairly common in a managed care population as evidenced by diagnosis and treatment. The combination of both diagnoses appears to increase the complexity of these patients with respect to comorbid conditions as well as increases the economic cost to payers.

*(J Clin Psychiatry 2006;67:1187–1193)*

*Received Sept. 13, 2005; accepted May 10, 2006. From NDCHealth, Phoenix, Ariz. (Drs. McLaughlin and Kruzikas); and Wyeth Research, Collegeville, Pa. (Drs. Khandker and Tummala). Drs. McLaughlin and Kruzikas are no longer employed by NDCHealth. Dr. Kruzikas is now an employee of GlaxoSmithKline.*

*Funding for this research project provided by Wyeth Research, Collegeville, Pa.*

*The authors report no additional financial or other relationship relevant to the subject of this article.*

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Depression and the anxiety disorders are among the most prevalent psychiatric disorders in the United States. While findings from studies vary, it is estimated that the lifetime prevalence of anxiety disorders ranges from 13.9% to 28.8% for anxiety disorder,[1,2] while the World Health Organization (WHO) Global Burden of Disease Survey estimates that by the year 2020, major depressive disorder will be second only to ischemic heart disease in the amount of disability experienced by sufferers.[3]

Numerous studies have shown that symptoms of anxiety are frequent in patients with major depressive disorder, and the presence of anxiety symptoms has been shown to be associated with a more severe and chronic course.[4–8] Conversely, the WHO Collaborative Study found that depression was 9 times more likely to develop in patients with anxiety disorders compared with those with no mental illness, with 39% of patients with current depression also having an anxiety disorder and 44% with a current anxiety disorder having comorbid depression.[9]

  

Table 1. ICD-9-CM Codes and Inclusion Diagnoses for Anxiety and Depression

| | | |
|---|---|---|
| Anxiety | Panic disorder without agoraphobia | 300.01 |
| | Panic disorder with agoraphobia | 300.21 |
| | Agoraphobia without history of panic disorder | 300.22 |
| | Social phobia | 300.23 |
| | Obsessive-compulsive disorder | 300.3 |
| | Posttraumatic stress disorder | 309.81 |
| | Acute stress disorder | 308.3 |
| | Generalized anxiety disorder | 300.02 |
| | Anxiety disorder due to general medical condition | 293.89 |
| | Anxiety states, other | 300.09 |
| | Anxiety disorder not otherwise specified | 300.00 |
| Depression | Major depressive disorder, single episode | 296.2 |
| | Major depressive disorder, recurrent episode | 296.3 |
| | Neurotic depression | 300.4 |
| | Depressive disorder, not elsewhere classified | 311 |

Abbreviation: ICD-9-CM = *International Classification of Diseases*, Ninth Revision, Clinical Modification.

The degree of disability caused by psychiatric illness has been shown to be comparable with the disability caused by chronic somatic disorders.[10] More importantly, comorbidity between different psychiatric disorders, such as comorbid anxiety and depression, has been shown to induce rates of disability that are significantly greater than those of the "pure" condition alone.[11]

Given the potential comorbidity of anxiety and depression, increased focus has been placed on the appropriate treatment of each condition.[12,13] Antidepressants and benzodiazepines have individually demonstrated some success in treating both depression and anxiety.

While there are several reports from epidemiologic studies on the frequency of anxiety disorders and/or depression in individuals, many of these analyses were conducted in either the early 1980s or 1990s and therefore may have limited utility in describing current trends, especially given the changes in health care insurance and diagnosis/treatment of mental health conditions that have occurred in the last few decades.[14] Additionally, little is currently known concerning the impact of the association between anxiety, depression, and the combination of the 2 on treatment patterns or resource utilization. Therefore, the objective of this analysis was to characterize anxiety and depression diagnosis, treatment, and impact on resource utilization within a managed care population distributed across the United States.

## METHOD

### Database

Data were obtained from the PharMetrics Patient-Centric Database, which is composed of medical and pharmaceutical claims for approximately 36 million unique patients from 61 health plans across the United States. The database includes both inpatient and outpatient diagnoses (in ICD-9-CM format) and procedures (in *Current Procedural Terminology,* Fourth Edition [CPT-4] and Healthcare Common Procedure Coding System [HCPCS] formats), as well as both standard and mail order prescription records; available data on prescription records include the National Drug Code (NDC) as well as days supplied and quantity dispensed. All medical and pharmaceutical claims include dates of service. Additional data elements include demographic variables (age, gender, geographic region), health plan type (e.g., health maintenance organization [HMO], preferred provider organization [PPO]), payer type (e.g., commercial, self-pay), provider specialty, and start and stop dates for plan enrollment.

Because all pertinent patient information in the database is encrypted and privacy-protected, no informed consent or approval by institutional review boards was required.

### Sample Selection

This was a retrospective, cross-sectional analysis of patients' utilization rates during 2002. Patients 18 years or older were included in the analysis if they had a diagnosis of depression or anxiety (refer to Table 1 for complete list of ICD-9-CM diagnosis codes) during 2002. Study patients were further required to have been continuously enrolled for the entire year (2002).

A comparison group was selected from the same time period. To be eligible for inclusion in this comparison (control) group, patients must have been at least 18 years of age and have had at least 1 medical claim (for any condition) and continuous enrollment for 2002 and could not have had a diagnosis of either anxiety or depression during 2002.

For both cases and controls, patients with a claim for a number of other mental health conditions (refer to Table 1 for list of diagnoses and their corresponding ICD-9-CM codes) or a prescription claim for lithium and/or any antipsychotic medications during 2002 were excluded from all analyses.

### Study Groups

Four study groups were identified based on the presence of anxiety and/or depression diagnosis: those with a diagnosis of anxiety but not depression ("anxiety only"), those with a diagnosis of depression but not anxiety ("depression only"), those with both anxiety and depression ("anxiety and depression"), and controls. These cohorts were mutually exclusive and based on the presence/absence of these respective diagnosis codes during the study period. Controls were matched to the anxiety and depression cohort using a 4:1 ratio, based on patient age and gender and an indicator of similar managed care organization.

Table 2. Sample Demographics

| | Anxiety Only (N = 119,849) | | Depression Only (N = 224,132) | | Anxiety + Depression (N = 66,548) | | Control Group (N = 266,192) | |
|---|---|---|---|---|---|---|---|---|
| Characteristic | N | % | N | % | N | % | N | % |
| Age group[a] | | | | | | | | |
| 18–39 y | 48,297 | 40 | 85,512 | 38 | 28,612 | 43 | 99,647 | 37 |
| 40–59 y | 59,806 | 50 | 119,053 | 53 | 33,030 | 50 | 150,009 | 56 |
| 60+ y | 11,746 | 10 | 19,567 | 9 | 4906 | 7 | 16,536 | 6 |
| Gender | | | | | | | | |
| Female | 79,381 | 66 | 160,587 | 72 | 48,062 | 72 | 192,985 | 72 |
| Male | 40,468 | 34 | 63,544 | 28 | 18,486 | 28 | 73,207 | 28 |
| Census region | | | | | | | | |
| East | 26,420 | 22 | 33,641 | 15 | 11,462 | 17 | 38,452 | 14 |
| Midwest | 45,617 | 38 | 109,464 | 49 | 30,062 | 45 | 129,064 | 48 |
| South | 33,409 | 28 | 47,345 | 21 | 14,789 | 22 | 57,834 | 22 |
| West | 14,403 | 12 | 33,682 | 15 | 10,235 | 15 | 40,842 | 15 |
| Physician specialty | | | | | | | | |
| General practice/ family practice | 71,324 | 60 | 142,551 | 64 | 45,328 | 68 | 140,805 | 53 |
| Internal medicine | 44,879 | 37 | 75,802 | 34 | 23,386 | 35 | 63,016 | 24 |
| Obstetrics/gynecology | 31,862 | 27 | 59,637 | 27 | 18,208 | 27 | 70,593 | 27 |
| Psychiatry | 11,424 | 10 | 42,592 | 19 | 15,792 | 24 | 1568 | 1 |
| Neurology/neurosurgery | 8422 | 7 | 16,255 | 7 | 5513 | 8 | 9165 | 3 |
| Psychology | 4487 | 4 | 15,308 | 7 | 5700 | 9 | 832 | 0 |
| All other specialties | 93,329 | 78 | 174,919 | 78 | 54,409 | 82 | 178,363 | 67 |

[a]Mean (SD) ages were 42.87 (12.99) years for the anxiety only cohort, 43.03 (12.82) years for the depression only cohort, 41.68 (12.64) years for the anxiety plus depression cohort, and 42.69 (11.72) years for the control group.

### Metrics

A descriptive retrospective analysis focusing on population-level anxiety-related and depression-related utilization over the 12-month study period (i.e., 2002) was conducted. Study groups were compared with respect to patient demographics, comorbid diagnoses, medication use, specialist care, utilization of health care services, and treatment costs (anxiety/depression-related and all cause).

Comorbid diagnoses were identified based on medical claims for any diagnosis during the study year. The Agency for Healthcare Research and Quality's Clinical Classifications Software for ICD-9 was used to group similar diagnosis codes into clinically meaningful groups.[13]

### Statistical Analysis

Statistical analyses included univariate techniques. Continuous variables are presented as mean values, while categorical variables are presented as percent of patients who were true to the criterion in question. All contrasts were conducted at a family-wise level of significance of .05. Bonferroni's adjustment was used in the case of multiple contrasts of the same variable (level of significance = 0.05/6 = 0.00833).

## RESULTS

After all of the above criteria were applied, 410,529 patients were included in the disease cohorts (anxiety only: 119,849 [29.2%], depression only: 224,132 [54.6%], anxiety and depression: 66,548 [16.2%]), and 266,192 patients were included in the control cohort (based on 4:1 match to anxiety and depression cohort).

As shown in Table 2, the nondisease control group matched the anxiety and depression group with respect to age, gender, and region. However, the anxiety only group had a significantly higher proportion of male patients (34% vs. 28%, $p < .0001$) than all other groups. Within the disease groups, patients with anxiety and depression were significantly more likely to have visited a psychiatrist during the year (anxiety and depression vs. anxiety only: 24% vs. 10%, $p < .0001$; anxiety and depression vs. depression only: 24% vs. 19%, $p < .0001$). While the control group was similar with respect to the matching variables, patients in that cohort were significantly less likely to visit any of the specialties of interest during the study period: for example, while 10% to 24% of the disease cohorts had at least 1 psychiatrist visit during 2003, only 1% of the control group had such a visit ($p < .0001$).

Comorbid diagnoses are presented in Table 3. Noteworthy are the disparities around somatic complaints such as abdominal pain, malaise, or chest pain: patients in the anxiety and depression cohort were twice as likely to have an abdominal pain diagnosis (19% vs. 10%, $p < .0001$), 3 times as likely to have malaise/fatigue (19% vs. 6%, $p < .0001$), and 2.5 times as likely to have a diagnosis of chest pain (16% vs. 7%, $p < .0001$) as their control group peers during the study period. Similarly, anxiety and depression patients were also more likely to have received diagnoses such as abdominal pain, malaise, or substance-related medical disorders than

Table 3. Most Frequent Diagnoses Identified During Study Period

| CCS Category[a] | Anxiety Only (N = 119,849) N | % | Depression Only (N = 224,132) N | % | Anxiety + Depression (N = 66,548) N | % | Control Group (N = 266,192) N | % |
|---|---|---|---|---|---|---|---|---|
| Abdominal pain | 20,129 | 17 | 33,863 | 15 | 12,818 | 19 | 25,484 | 10 |
| Acute bronchitis | 11,923 | 10 | 20,838 | 9 | 7478 | 11 | 16,569 | 6 |
| Affective disorders | … | … | 95,018 | 42 | 30,297 | 46 | … | … |
| Alcohol-related mental disorders | 1495 | 1 | 4126 | 2 | 2196 | 3 | 754 | 0 |
| Anxiety, somatoform, dissociative, and personality disorders | 117,569 | 98 | 9160 | 4 | 64,414 | 97 | 2355 | 1 |
| Asthma | 8297 | 7 | 15,349 | 7 | 5460 | 8 | 10,652 | 4 |
| Blindness and vision defects | 12,106 | 10 | 25,579 | 11 | 8076 | 12 | 28,167 | 11 |
| Cardiac dysrhythmias | 13,646 | 11 | 12,480 | 6 | 5903 | 9 | 9460 | 4 |
| Chronic obstructive pulmonary disease and bronchiectasis | 8061 | 7 | 14,414 | 6 | 5111 | 8 | 9768 | 4 |
| Conditions associated with dizziness or vertigo | 9539 | 8 | 12,353 | 6 | 5369 | 8 | 7983 | 3 |
| Coronary atherosclerosis and other heart disease | 6063 | 5 | 8895 | 4 | 2731 | 4 | 6023 | 2 |
| Diabetes mellitus with complications | 2688 | 2 | 7486 | 3 | 1649 | 2 | 5484 | 2 |
| Diabetes mellitus without complication | 6907 | 6 | 17,174 | 8 | 4008 | 6 | 14,218 | 5 |
| Disorders of lipid metabolism | 26,608 | 22 | 48,392 | 22 | 13,551 | 20 | 43,139 | 16 |
| E codes: adverse effects of medical drugs | 620 | 1 | 919 | 0 | 412 | 1 | 583 | 0 |
| E codes: poisoning | 191 | 0 | 553 | 0 | 496 | 1 | 93 | 0 |
| Esophageal disorders | 15,683 | 13 | 24,108 | 11 | 9221 | 14 | 14,490 | 5 |
| Essential hypertension | 29,229 | 24 | 47,632 | 21 | 14,472 | 22 | 41,617 | 16 |
| Gastritis and duodenitis | 5388 | 4 | 7406 | 3 | 3212 | 5 | 4662 | 2 |
| Gastroduodenal ulcer (except hemorrhage) | 1074 | 1 | 1614 | 1 | 691 | 1 | 954 | 0 |
| Gastrointestinal hemorrhage | 4298 | 4 | 7360 | 3 | 2441 | 4 | 5624 | 2 |
| Headache, including migraine | 16,868 | 14 | 30,571 | 14 | 12,165 | 18 | 18,758 | 7 |
| Hypertension with complications and secondary hypertension | 3316 | 3 | 4125 | 2 | 1319 | 2 | 3421 | 1 |
| Malaise and fatigue | 16,800 | 14 | 34,926 | 16 | 12,509 | 19 | 17,113 | 6 |
| Nausea and vomiting | 6715 | 6 | 11,431 | 5 | 5098 | 8 | 6226 | 2 |
| Nonspecific chest pain | 22,496 | 19 | 24,980 | 11 | 10,901 | 16 | 17,932 | 7 |
| Other connective tissue disease | 30,047 | 25 | 60,676 | 27 | 19,570 | 29 | 49,044 | 18 |
| Other lower respiratory disease | 23,725 | 20 | 36,122 | 16 | 13,484 | 20 | 25,813 | 10 |
| Other nontraumatic joint disorders | 21,678 | 18 | 44,947 | 20 | 14,231 | 21 | 35,179 | 13 |
| Other upper respiratory disease | 20,598 | 17 | 35,453 | 16 | 12,536 | 19 | 28,147 | 11 |
| Other upper respiratory infections | 41,039 | 34 | 75,137 | 34 | 25,839 | 39 | 68,572 | 26 |
| Spondylosis, intervertebral disc disorders, other back problems | 29,175 | 24 | 56,256 | 25 | 19,049 | 29 | 43,894 | 16 |
| Substance-related mental disorders | 7073 | 6 | 13,704 | 6 | 5807 | 9 | 6896 | 3 |
| Thyroid disorders | 11,007 | 9 | 23,049 | 10 | 6875 | 10 | 19,282 | 7 |
| Urinary tract infections | 12,062 | 10 | 22,305 | 10 | 7875 | 12 | 18,660 | 7 |
| Viral infection | 9329 | 8 | 17,197 | 8 | 6076 | 9 | 14,378 | 5 |

[a]Agency for Healthcare Research and Quality's Clinical Classifications Software (CCS) category.

patients in the anxiety only or depression only groups. In addition to the aforementioned trends, rates of other somatic complaints such as headache and nausea and vomiting were also observed to be significantly higher in the disease groups than in the control group and, within the disease groups, higher in the anxiety and depression patients than in those with either anxiety only or depression only.

As expected, use of anxiolytics and antidepressants was significantly higher in the disease cohorts compared to the control group (Table 4). Patients with anxiety and/or depression were significantly more likely than control cohort patients to receive narcotic analgesics, proton-pump inhibitors ("Antispasm/Antisecr, Other"), and muscle relaxants, suggesting that these patients are more likely to present to their physician with somatic complaints (pain, gastrointestinal discomfort, etc.). Within the disease groups, medication use tended to be most prevalent in the anxiety and depression group: narcotic analgesics, anxiety and depression > depression only > anxiety only; anticonvulsants, anxiety and depression > anxiety only > depression only; muscle relaxants, anxiety and depression > anxiety only = depression only.

In addition to anxiety- and/or depression-related visits, patients in the disease cohorts also incurred significantly more visits not related to depression or anxiety than their control group counterparts (Table 5). For example, the anxiety and depression cohort, on average, had 0.58 inpatient stays during 2003, which was almost 3 times the rate observed in the control group (0.20). This, coupled with the higher emergency department (ED) visit rate (0.55 vs. 0.19), suggests that these patients were much more likely to incur significant acute events than patients in the control group, even after events with a primary diagnosis of anxiety or depression were excluded.

When the disease groups were compared, anxiety and depression patients, on average, had higher utilization of all medical services compared to anxiety only or depression only patients. With respect to high-cost, avoidable events such as ED visits and hospitalizations, anxiety and

**Table 4. Other Medication Utilization**

| Drug Class | Anxiety Only (N = 119,849) N | % | Depression Only (N = 224,132) N | % | Anxiety + Depression (N = 66,548) N | % | Control Group (N = 266,192) N | % |
|---|---|---|---|---|---|---|---|---|
| Analgesics, narcotic | 29,953 | 25.0 | 60,662 | 27.1 | 19,954 | 30.0 | 47,335 | 17.8 |
| Analgesics, nonnarcotic | 14,721 | 12.3 | 29,223 | 13.0 | 10,320 | 15.5 | 20,036 | 7.5 |
| Antiarthritics, systemic | 24,143 | 20.1 | 49,134 | 21.9 | 15,284 | 23.0 | 41,041 | 15.4 |
| Antibiotics, broad and medium | 50,132 | 41.8 | 93,898 | 41.9 | 29,900 | 44.9 | 90,864 | 34.1 |
| Anticonvulsants | 9754 | 8.1 | 17,290 | 7.7 | 9082 | 13.6 | 5239 | 2.0 |
| Antidepressant | 54,691 | 45.6 | 154,273 | 68.8 | 48,463 | 72.8 | 22,389 | 8.4 |
| Antihistamines, caps and tabs | 15,372 | 12.8 | 28,429 | 12.7 | 9684 | 14.6 | 23,230 | 8.7 |
| Antihypertensive drugs | 14,915 | 12.4 | 27,364 | 12.2 | 7212 | 10.8 | 25,731 | 9.7 |
| Antinauseants | 5430 | 4.5 | 9413 | 4.2 | 3535 | 5.3 | 6439 | 2.4 |
| Antispasm/antisecr, other | 20,332 | 17.0 | 35,216 | 15.7 | 11,886 | 17.9 | 23,519 | 8.8 |
| Beta-blocking agents | 13,166 | 11.0 | 17,802 | 7.9 | 5938 | 8.9 | 16,233 | 6.1 |
| Calcium channel blockers | 5884 | 4.9 | 9961 | 4.4 | 2915 | 4.4 | 9151 | 3.4 |
| Cholesterol reducers | 12,651 | 10.6 | 25,920 | 11.6 | 6529 | 9.8 | 22,016 | 8.3 |
| Corticoids, plain | 19,723 | 16.5 | 36,755 | 16.4 | 11,718 | 17.6 | 33,055 | 12.4 |
| Cough/cold preparations | 8911 | 7.4 | 15,236 | 6.8 | 5446 | 8.2 | 14,047 | 5.3 |
| Diabetes therapy, insulin | 762 | 0.6 | 2918 | 1.3 | 550 | 0.8 | 1939 | 0.7 |
| Diabetes therapy, oral | 3644 | 3.0 | 9837 | 4.4 | 2095 | 3.1 | 8790 | 3.3 |
| Muscle relaxants, nonsurgical | 12,721 | 10.6 | 24,450 | 10.9 | 8992 | 13.5 | 15,944 | 6.0 |
| Oral contraceptives | 10,896 | 9.1 | 22,666 | 10.1 | 7083 | 10.6 | 25,300 | 9.5 |
| Penicillins | 4408 | 3.7 | 8650 | 3.9 | 2767 | 4.2 | 8806 | 3.3 |
| Tranquilizers | 41,412 | 34.6 | 33,389 | 14.9 | 23,710 | 35.6 | 11,715 | 4.4 |

depression patients averaged 4 times more anxiety- or depression-related hospitalizations and ED visits than depression only patients and 8 times more anxiety- or depression-related hospitalizations than anxiety only patients (although the ED visit rate for anxiety and depression patients was only 25% higher than that observed for anxiety only patients). Similar results were observed when the measure was broadened to encompass events not identified as "anxiety-related" or "depression-related" based on ICD-9-CM codes: while the anxiety and depression group averaged 0.6 hospital claims per patient (not related to anxiety or depression) during the study period, anxiety only patients averaged 0.4 per patient, and depression only patients averaged 0.4 per patient.

Similarly, patients in the disease cohorts also incurred significantly higher total cost than the control group; while a portion of this could be attributed directly to anxiety or depression, there was still a $2000 to $3000 per patient difference in nonanxiety, nondepression costs between the disease cohorts and control group (Table 6). Within the disease groups, anxiety and depression patients incurred significantly higher mean (anxiety- or depression-related) treatment costs than the anxiety only and depression only cohorts: mean costs were 2.5 times as high compared to the anxiety only group and 1.4 times as high compared to the depression only group. Similarly, the mean total (not anxiety- or depression-related) treatment costs were higher in the anxiety and depression group, though the differences, while statistically significant, were not as substantial: 1.2 times as high as in the anxiety only group and 1.1 times as high as in the depression only group.

As shown in Table 7, after potential confounding variables were controlled for, anxiety and/or depression were still associated with significantly higher total treatment costs (compared to lack of either condition), and the intersection of both conditions was associated with a doubling in health care expenditures during the study period. Other factors shown to be significant predictors of higher cost were female gender, increased age, and a higher chronic disease score.

Anxiety and/or depression diagnosis was also associated with a higher propensity for ED visits or hospitalizations, as indicated in Table 8. After other variables were controlled for, patients with both anxiety and depression were 2.3 times as likely as control group patients to have had an ED visit or hospitalization during the study period (OR = 2.278, 95% CI = 2.237 to 2.326).

## DISCUSSION

Previous epidemiologic studies have documented the high degree of overlap between anxiety and depression.[2–8] In this analysis, approximately 30% of patients with a depression diagnosis also had a diagnosis of an anxiety disorder, while 55.5% of patients with an anxiety disorder also had a claim for depression. These results are consistent with those presented by Sartorius and colleagues[15] using the WHO Study on Psychological Disorders in Primary Care data, where 39% of patients with current depression also had an anxiety disorder and 44% with a current anxiety disorder also had comorbid depression.

In addition to showing a high degree of comorbidity between anxiety and depression, the analysis revealed that

**Table 5. Utilization of Health Care Resources**

| | Anxiety Only | | Depression Only | | Anxiety + Depression | | Control Group | |
|---|---|---|---|---|---|---|---|---|
| Variable | Mean | SD | Mean | SD | Mean | SD | Mean | SD |
| Related to anxiety or depression | | | | | | | | |
| Ancillary visit | 0.11 | 0.54 | 0.15 | 0.80 | 0.25 | 1.04 | … | … |
| ED visit | 0.04 | 0.21 | 0.01 | 0.09 | 0.05 | 0.26 | … | … |
| Inpatient visit | 0.01 | 0.11 | 0.02 | 0.31 | 0.08 | 0.71 | … | … |
| Outpatient visit | 1.34 | 3.31 | 2.32 | 4.58 | 3.66 | 5.81 | … | … |
| Prescriptions | 4.17 | 5.77 | 5.54 | 6.35 | 7.03 | 7.47 | 0.58 | 2.33 |
| Not related to anxiety or depression | | | | | | | | |
| Ancillary visit | 5.99 | 7.74 | 6.34 | 8.74 | 6.74 | 8.84 | 4.26 | 5.98 |
| ED visit | 0.46 | 1.18 | 0.35 | 0.98 | 0.55 | 1.65 | 0.19 | 0.61 |
| Inpatient visit | 0.43 | 2.62 | 0.53 | 3.38 | 0.58 | 3.22 | 0.20 | 1.46 |
| Outpatient visit | 8.38 | 9.26 | 8.70 | 9.65 | 9.84 | 10.40 | 5.54 | 7.15 |
| Prescriptions | 14.00 | 18.53 | 15.12 | 19.90 | 16.10 | 20.99 | 9.63 | 14.34 |

Abbreviation: ED = emergency department.

**Table 6. Health Care–Related Costs ($)**

| | Anxiety Only | | Depression Only | | Anxiety + Depression | | Control Group | |
|---|---|---|---|---|---|---|---|---|
| Type of Cost | Mean | SD | Mean | SD | Mean | SD | Mean | SD |
| Costs related to anxiety or depression | | | | | | | | |
| Visits | | | | | | | | |
| Ancillary | 12 | 110 | 16 | 297 | 31 | 282 | … | … |
| ED visit | 12 | 102 | 2 | 46 | 20 | 141 | … | … |
| Inpatient | 5 | 184 | 14 | 436 | 73 | 802 | … | … |
| Outpatient | 86 | 254 | 159 | 364 | 258 | 496 | … | … |
| Total costs for visits | 115 | 351 | 191 | 667 | 382 | 1071 | … | … |
| Prescription | 184 | 344 | 326 | 483 | 364 | 506 | 24 | 127 |
| Total cost (anxiety or depression) | 299 | 501 | 517 | 848 | 746 | 1218 | 24 | 127 |
| Costs not related to anxiety or depression | | | | | | | | |
| Visits | | | | | | | | |
| Ancillary | 1391 | 4040 | 1488 | 4441 | 1554 | 3921 | 857 | 2837 |
| ED visit | 239 | 981 | 172 | 683 | 275 | 1004 | 92 | 469 |
| Inpatient | 1641 | 11,415 | 2049 | 15,821 | 2124 | 13,418 | 871 | 6671 |
| Outpatient | 929 | 1924 | 989 | 2147 | 1089 | 2160 | 630 | 1669 |
| Total costs for visits | 4201 | 13,709 | 4697 | 17,958 | 5042 | 15,937 | 2451 | 8423 |
| Prescription | 613 | 1473 | 768 | 1996 | 729 | 1733 | 432 | 1220 |
| Total cost (all cause) | 4814 | 14,079 | 5465 | 18,374 | 5771 | 16,369 | 2882 | 8715 |

Abbreviation: ED = emergency department.

**Table 7. Multivariate Comparison of Total Health Care Expenditures[a]**

| Variable | Referent | β Coefficient[b] | Standard Error | p Value |
|---|---|---|---|---|
| Anxiety only | Control group | 0.74379 | 0.00460 | < .0001 |
| Depression only | Control group | 0.86229 | 0.00377 | < .0001 |
| Anxiety and depression | Control group | 1.03698 | 0.00565 | < .0001 |
| Age | Unit increase | 0.01344 | 0.00013377 | < .0001 |
| Chronic disease score | Unit increase | 0.23363 | 0.00071751 | < .0001 |
| Male gender | Female gender | –0.37335 | 0.00349 | < .0001 |

[a]Also controlled for dataset ID (proxy for managed care plan); adjusted $R^2 = 0.2844$, N = 676,720.
[b]Dependent variable = natural log (total costs), therefore β coefficient represents percent difference—i.e., patients in anxiety only cohort averaged 74% higher total costs than the control group, after accounting for other variables in model.

the impact of having both of these conditions concomitantly appears to be greater than that of having either of these conditions alone, which concurs with previous findings.[10] Specifically, there appears to be significant impact on health care utilization: compared to anxiety only or depression only patients, those with both diagnoses were significantly more likely to have had an ED visit or hospitalization during the study period. These higher rates of potentially avoidable events in turn lead to higher treatment costs, with anxiety and depression patients incurring 20% and 10% higher cost than anxiety only and depression only patients, respectively, during the study period.

This study, like any retrospective analysis of administrative claims data, has a number of limitations. First,

Table 8. Multivariate Comparison of Emergency Department (ED) Visit/Hospitalization Rates

| Variable | Referent | Adjusted Odds Ratio[a] | 95% CI Lower | 95% CI Upper |
|---|---|---|---|---|
| Anxiety only | Control group | 1.934 | 1.901 | 1.965 |
| Depression only | Control group | 1.560 | 1.538 | 1.582 |
| Anxiety and depression | Control group | 2.278 | 2.237 | 2.326 |
| Age | Unit increase | 0.982 | 0.981 | 0.982 |
| Chronic disease score | Unit increase | 1.183 | 1.181 | 1.186 |
| Male gender | Female gender | 0.864 | 0.853 | 0.874 |

[a]Predicting likelihood of having at least 1 ED visit/hospitalization during study period, after accounting for other variables in model.

identification of patients with "anxiety disorder" and "depression" was based on medical claims with ICD-9 diagnoses for these conditions. As it was not possible to confirm this diagnosis with a review of the patient's chart or collection of any clinical test results, it is possible that a number of patients were falsely identified as having either condition when indeed they did not. However, the high treatment rates present in the data (70% of depression patients received antidepressant therapy during the study period) would suggest that false-positives were the minority and would not fully explain the results observed here. A 4-fold larger nondisease control group was randomly selected from the same population and matched to the anxiety and depression cohort based on age, gender, and region. While this matching ensured that the control group was similar to the disease cohorts with respect to the matching variables, it is still highly likely that the cohorts differed with respect to other factors beyond the presence of anxiety or depression diagnosis. Attempts to adjust for these differences via multivariate analysis still confirmed the aforementioned trends: anxiety and/or depression was associated with a higher risk for ED visits or hospitalizations and higher total treatment costs, while the intersection of both conditions was associated with a doubling of both ED/hospitalization risk and total cost.

In conclusion, anxiety and depression appear not only to be commonly diagnosed in a managed care population, but also to be commonly diagnosed and treated concomitantly. This combination appears to increase the complexity of these patients with respect to symptomatic complaints and increases their economic cost to payers. Further research is necessary to determine the impact of adequate treatment on these other complaints and costs, but at the very least providers should be aware of the potential overlap of these conditions when prescribing therapy.

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