MEDICAL COST OFFSET EFFECTS IN PULMONARY AND CARDIAC PATIENTS WITH DEPRESSION OR ANXIETY

By

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A THESIS PRESENTED TO THE GRADUATE SCHOOL
OF THE UNIVERSITY OF FLORIDA IN PARTIAL FULFILLMENT
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This document is dedicated to my parents, Jack and Ellen Lee, and to my grandparents, Harvey Lim, Lan Chan Lim, Sonny Lee, and Laura Lee.

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An intervention that reduces or prevents usual costs to the health care system is called a medical cost offset or the cost offset effect. This study examined a sample of pulmonary patients and cardiac patients to determine if a cost offset effect was apparent. Three research questions were examined in this study: (1) whether depression or anxiety in pulmonary or heart patients increased health care expenditures, (2) whether depression or anxiety treatment decreased health care expenditures, and (3) whether depression or anxiety treatment decreased the number of emergency room visits, inpatient days, outpatient visits, or office-based provider visits. Data were obtained from the Medical Expenditure Panel Survey (MEPS), a nationally representative survey of the US non-institutionalized, civilian population. The results of the study revealed that in pulmonary patients, the presence of depression increased expenditures, whereas the presence of anxiety decreased expenditures. Furthermore, depressed pulmonary patients showed a decrease in expenditures and this effect was not explained by a decrease in the number of

outpatient hospital visits, inpatient hospital nights, office-based provider visits, or emergency room visits. Anxious pulmonary patients who received mental health treatment showed an increase in expenditures; however, there was a reduction in outpatient hospital visits in this sample. The results suggest that the medical cost offset effect is not a constant phenomenon and appears to vary across psychological and medical conditions.

CHAPTER 1
INTRODUCTION

The health care system in the United States is in a state of fiscal crisis. Total health care spending is on the rise each year and there is no evidence that this trend will subside. Between 1987 and 2000, health care spending among the noninstitutionalized US population increased by about $199 billion (about 3 percent per year) (Thorpe, Florence, & Joski, 2004). Mental health treatment has been cited as a solution to reducing rising costs in the health care system (Friedman et al., 1995). The cost offset effect occurs when an intervention reduces or prevents usual costs to the health care system.

There are many reasons for the rise in health care expenditures, one of which is the rise in the number of individuals with chronic diseases. With the aging of the population, the rise in chronic diseases has seen a dramatic rise in recent years (World Health Organization [WHO], 2006). The majority of this change was attributed to spending for cardiac disease, psychological conditions, pulmonary disorders, cancer, and trauma. In a report by the Agency for Healthcare Research and Quality (AHRQ), the most expensive type of chronic condition in 1997 and 2002 was cardiac conditions and the greatest increase in health care expenditures occurred for pulmonary conditions and psychological conditions (Olin & Rhoades, 2005).

The utilization pattern of patients with chronic medical diseases is complicated when patients have comorbid psychological conditions. Due to the ongoing nature of chronic diseases, patients who have one or more chronic diseases tend to be high utilizers of the health care system and thereby expensive to the system. Although cardiac

conditions, pulmonary conditions, and psychological conditions have been identified as expensive chronic conditions in the US health care system, when cardiac conditions and pulmonary conditions are comorbid with psychological conditions, expenditures tend to be greater than the cost of each condition alone. Primary care patients with psychological conditions tend to utilize the health care system more often than patients without comorbid psychological conditions. In studies of primary care patients, medical costs of patients with depressive symptoms or major depression were higher than patients without depression (Katon, 2003). For example, patients with congestive heart failure who also present with depression have medical costs 26 to 29 percent higher than those with congestive heart failure only.

The prevalence of psychological conditions comorbid with cardiac conditions or pulmonary conditions is high. In particular, depression and anxiety are more frequent in these medical populations. A study determining the associations between anxiety disorders and physical illness found that both males and females with an anxiety disorder have higher rates of cardiac disorders and pulmonary illnesses compared to individuals without anxiety disorders (Harter, Conway, & Merikangas, 2003). In a pilot study on individuals with congenital heart disease, 27.3 percent met the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) diagnostic criteria for depressive episode and 9.1 percent met the DSM-IV criteria for generalized anxiety disorder (GAD) (Bromberg et al., 2003). Depression comorbid with the respiratory condition, chronic obstructive pulmonary disorder (COPD) is estimated to be up to four times more frequent than in COPD alone (van Ede et al., 1999, as cited in Kunik et al., 2005). In a study

screening COPD patients for depression or anxiety, 80 percent screened positive for depression, anxiety, or both (Kunik et al., 2005).

Despite the prevalence of depression and anxiety in medical populations, there is evidence that the diagnosis and treatment of patients with depression or anxiety is lacking. Epidemiological studies generally show that those with mental health problems underutilize mental health care (Collins et al., 2004). Only 25 percent to 40 percent of severely mentally ill patients access specialty mental health care and only 15.3 percent receive adequate treatment (as cited in Collins et al., 2004). For those with anxiety and mood disorders, the average delay for seeking professional treatment was 8 years.

Given the current trend toward inadequate detection and treatment of psychological conditions, as well as the prevalence and high expenditures of patients with comorbid psychological conditions and medical conditions, the question becomes whether treating the mental health problems of medical patients would reduce expenditures in the health care system. When an intervention reduces or prevents usual costs to the health care system, this is called a medical cost offset or the cost offset effect (Carlson & Bultz, 2004).

Numerous studies have attempted to ascertain a medical cost-offset effect of mental health care in primary care patients with psychological conditions. One of the first offset studies was conducted by Follette and Cummings (1968). The medical records of 152 randomly selected adults who sought psychological services were examined. Data on their health services utilization were collected one year prior to the beginning of psychological treatment, as well as five years following treatment. Comparing the data to a group matched for age, sex, socioeconomic status, and medical utilization rates who

had not received psychological treatment, it was found that this comparison group had higher health care utilization rates over time, in addition to a reduction in health care utilization for the group receiving psychological treatment.

Following the Follette and Cummings (1968) study, a series of cost-offset studies were conducted. In 1984, two meta-analyses of the literature were published (Mumford et al., 1984). One analysis was conducted on Blue Cross Blue Shield Federal Employee Plan claims from 1974 to 1978, and the other analysis was conducted on 58 published studies. The basic conclusion from these meta-analyses was that 85 percent of the studies found a cost-offset effect, mainly observed in the reduction of inpatient days.

In another meta-analysis of 91 studies from 1967 to 1997, 90 percent of the studies reported a reduction in medical utilization following mental health interventions (Chiles, Lambert, & Hatch, 1999). Twenty-eight articles reported dollar savings and 31 percent reported savings after taking into account the cost of mental health treatment. Overall, a savings of about 20 to 30 percent was reported across the articles. The effect was most evident for behavioral medicine and psychoeducational interventions.

Despite the evidence supporting the cost offset effect, several studies provide evidence against the effect. The Medical Outcomes Study involved 22,000 outpatients who were screened for several chronic medical conditions and these patients were followed over time (Wells et al., 1996). One focus of the study was on the comparisons between patients who received appropriate mental health treatment and those who had not. The study produced no evidence of reduced inpatient or outpatient services. Instead, cost-shifting occurred, in which the care received simply shifted from the patients' general medical provider to a mental health provider.

The Fort Bragg Evaluation Project involved data collection of children and their families over seven occasions to evaluate the effectiveness of comprehensive mental health services to children and adolescents (Bickman, 1996). Compared to children receiving care under traditional insurance, mental health expenditures were much higher for children who received comprehensive care and this rise in cost was not offset by cost savings elsewhere.

In two related studies looking at the medical utilization of patients with and without psychological symptoms and the possible reduction in medical utilization in patients referred to a psychiatry clinic, it was found that depressed and anxious patients who saw a mental health provider had significantly more medical visits, emergency room visits, and medical outpatient visits than patients with depression or anxiety who had not seen mental health providers (Carbone et al., 2000). There were no significant differences in medical costs between patients seeing mental health providers and those who had not. However, both studies did not control for illness severity or comorbid medical or psychiatric conditions. The patients in both studies had a relatively young median age and one of the two studies had a small sample size. These factors may have made medical cost-offset effects more difficult to demonstrate.

In a 2-year longitudinal study comparing adults who had major depression who had remitted, improved but not remitted, or remained depressed, it was found that recovery from depression was associated with increases in the probability of paid employment and reductions in days missed from work due to illness (Simon et al., 2000). In terms of health care costs, there were no significant differences in cost among groups in year one. However, cost savings for patients with better outcomes in year two showed marginal

significance, suggesting the long-term nature of medical cost-offset. It should also be noted that the study sample was derived from HMO clinics, which has implications for cost offset effects. That is, to the extent that managed care restrictions reduce length of treatment, dramatic cost offsets would also be reduced (Otto, 1999).

There are several limitations to cost offset studies and this study was an attempt to address these limitations. First, when studies compare the costs of treated and untreated patients, there may be a selection bias in which samples are not comparable (Sturm, 2001). That is, patients who received treatment may have different characteristics than patients who did not receive treatment. If there is limited case-mix information in the data, the selection bias is particularly pronounced. This is particularly problematic with administrative datasets. In this study, the use of a large comprehensive dataset allowed for greater control of potential confounding variables, such as illness severity and comorbid medical conditions.

Second, cost offsets have traditionally been referred to as a general phenomenon applying to all medical populations. Past cost offset research has not yet teased apart which medical populations benefit from psychological interventions. This study is a preliminary effort to identify specific cost offset effects in particular populations. The populations of interest were pulmonary and cardiac patients who had comorbid depression or anxiety. The dataset was a nationally representative sample, which allowed for greater generalizability for the populations in question.

Rapid changes in healthcare financing and spending patterns necessitates frequent review of offset effects refelcting current pricing in pharmacological and medical treatments (Hunsley, 2003). It is difficult to generalize cost offset effects from one year

to another, due to pricing differences between years. This study used data from 2002, which was the most recent data available at study onset. This study combined previous years with 2002 data and prices of the previous years were inflated to reflect 2002 rates.

Research Questions

Research Question 1

After controlling for demographic characteristics, comorbidities, insurance status, and perceived mental and physical health status, do pulmonary and cardiac patients with comorbid depression or anxiety have higher health care expenditures than those with pulmonary or cardiac conditions alone? The specific aim is to determine if, and to what extent, depression or anxiety increases health care expenditures in pulmonary or cardiac patients. The hypothesis is that the presence of depression or anxiety will correspond to an increase in health care expenditures.

Research Question 2

After controlling for demographic characteristics, comorbidities, insurance status, and perceived mental and physical health status, do pulmonary and cardiac patients with comorbid depression or anxiety who received mental health treatment have lower health care expenditures than those patients who did not receive mental health treatment? The specific aim is to determine if, and to what extent, the treatment of depression or anxiety affects health care expenditures in pulmonary or cardiac patients. The hypothesis is that mental health treatment will correspond to a decrease in health care expenditures.

Research Question 3

After controlling for demographic characteristics, comorbidities, insurance status, and perceived mental and physical health status, do pulmonary and cardiac patients with

comorbid depression or anxiety who received mental health treatment have decreased health service utilization? The specific aim is to determine if, and to what extent, treatment of depression or anxiety decreases health care service utilization in pulmonary or cardiac patients. The hypothesis is that mental health treatment will correspond to a decrease in health care service utilization.

CHAPTER 2
DATA AND METHODS

Data Source

Data were obtained from the Medical Expenditure Panel Survey (MEPS), a nationally representative survey of the US non-institutionalized, civilian population, sponsored by the Agency for Healthcare Research and Quality (AHRQ). The MEPS was created in 1996 and consists of information on health services utilization, costs and payments of health services, and health insurance information of respondents. The MEPS Household Component (HC) obtains data from a sample of families and individuals across the country. The MEPS HC has an overlapping panel design in which each panel of households is interviewed five times during a two-year period. The HC obtains detailed information on demographic characteristics, health conditions, health status, use of medical care services, charges and payments, access to care, satisfaction with care, health insurance coverage, income, and employment. During the second year of the original panel, a new sample is drawn to create a new panel. Thus, two separate panels are interviewed in the same year, which makes for an overlapping sampling design. This thesis combined 1999, 2000, 2001, and 2002 MEPS data to assess the effect of mental health treatment on health care expenditures and health services utilization.

As a nationally representative survey, each respondent in the MEPS data represents a group of Americans that share similar characteristics used to sample from the population. A sample weight for each case is developed to incorporate in the estimation processes, in order to account for sample design, including unequal probability sampling

of the population (i.e., oversampling minority groups), as well as non-response rates and partial responses from some survey participants. To maintain national representation, this study used sample weights to test hypotheses.

Variables

Dependent Variables

Health care expenditures were divided into two variables: total health care expenditures and medical expenditures. Expenditures in MEPS are defined as the sum of direct payments for care provided during the year, including out-of-pocket payments and payments by private insurance, Medicaid, Medicare, and other sources. Not included in MEPS total expenditures are payments for over-the-counter drugs and for alternative care services, as well as indirect payments not related to specific medical events, such as Medicaid Disproportionate Share and Medicare Direct Medical Education subsidies. Total expenditures are defined as total payments for all health care services included in MEPS (outpatient department visits, office-based medical provider visits, prescribed medicines, hospital inpatient visits, emergency room visits, home health, dental visits, and other medical expenses). Medical expenditures are defined as total payments for all health care services associated with medical conditions only. Put another way, any medical expense associated with a psychological condition was excluded from the calculation of the medical expenditure variable. When combining all four years of data (1999 to 2002), both total expenditures and medical expenditures from 1999, 2000, and 2001 data were inflated to 2002 dollars using the consumer price index (BLS, 1999-2002).

Health services utilization was defined using four separate variables: total number of hospital outpatient visits, total hospital inpatient nights at discharge, total number of all emergency room visits, and total number of office-based provider visits.

Independent Variables

The medical conditions of interest were identified using the MEPS HC medical conditions file. The medical conditions file codes each self-reported medical condition the individual experiences during the year. In order to preserve respondent confidentiality, the condition codes provided on this file have been collapsed from fully-specified codes to 3-digit code categories. Medical conditions were coded using the International Classification of Diseases, Ninth Revision (ICD-9) codes and classification codes (CC) as constructed using AHRQ's Clinical Classification Software (CCS). CCS aggregates ICD-9 codes into clinically meaningful categories and these categories were collapsed based on the clinical significance of categories, accurate reporting from respondents, and the frequency of the reported condition.

From past research identifying spending and service use trends for various medical conditions, pulmonary conditions were identified from the MEPS HC medical conditions file using CC 127-134 and cardiac conditions were identified using CC 96, 97, 100-108 (Olin & Rhoades, 2005). For a breakdown of CC categories, see Table A-1.

Depression was identified using ICD-9 code 311. Although ICD-9 code 296 corresponds to depression, it also includes individuals with bipolar disorder. When considering ICD-9 codes 296 and 311, 93 percent of respondents had a code of 311, which corresponds to unspecified depression. The large number of patients with ICD-9 code 311 suggests that respondents are likely self-reporting depression (as opposed to major depression), which then received a code of 311 instead of 296. Thus, ICD-9 code

311 was used to identify respondents with depression and ICD-9 code 296 was excluded. Anxiety was identified using ICD-9 code 300.

Mental health treatment was defined in this study as psychotherapy or psychotropic medications. Respondents who received psychotherapy were determined from the MEPS HC office-based medical provider visit file and outpatient visit file. In the office-based medical provider visit file, the best category for care that patient received was coded. Respondents were considered to have undergone psychotherapy if the best category of care was psychotherapy/mental health counseling. In the MEPS HC prescribed medicines file, the presence of psychotropic medications were determined. If particular anti-anxiety or anti-depressant drugs were coded under medication name (see Table A-2), respondents were considered to be taking psychotropic medications for their mental health condition.

Control Variables

Because some populations are at higher risk for poor health outcomes than others and thus, higher health care expenditures, we adjusted for these differences to compare health outcomes among different patient populations (Iezzoni, 2003). Patient demographic variables (age, sex, and race) and socioeconomic factors (education and income), obtained directly from pre-existing MEPS variables, were used to control for differences in mortality and morbidity. With regards to age, older persons generally have worse clinical outcomes than younger persons (Iezzoni, 2003). Sex is an important control variable because men and women face different risks for certain diseases. Among men and women 65 years of age and older, men have higher death rates than women for cardiac disease and chronic lower respiratory disease (Anderson, 2002). Furthermore, life spans for women tend to be longer on average than for men. Racial disparities in

health care outcomes were also taken into account in this study because differences in disease prevalence and mortality exist among the races (Iezzoni, 2003). Because of socioeconomic disparities in health status and outcomes, we also controlled for income and education factors (Braveman & Tarimo, 2002).

Proxy measures of illness severity were employed in the analysis to further control for differences among patient populations. Self-perceived mental and physical health status and number of comorbidities were used to control for illness severity. Self-perceived mental health status and self-perceived physical health status were variables defined in MEPS and these are considered risk factors in health care outcomes (Iezzoni, 2003). Self-perceived mental and physical health status were reported by patients on a likert scale of excellent, very good, good, fair, and poor. Comorbidites were a significant consideration because patients with comorbidities tend to have higher risks of death, complications, functional impairments, and higher health service use (Iezzoni, 2003). Comorbidities were determined from the MEPS HC medical conditions file in the number of different ICD-9 codes in an individual's file were tallied.

Health insurance status was an additional variable that was created in order to control for health service utilization. The MEPS HC full year consolidated file was used to identify patients who were insured (i.e., insured all months of the year), intermittently insured (i.e., at least one month of the year without health insurance), and uninsured (i.e., no health insurance for all months of the year). This was a control variable because it is expected that individuals insured throughout the year would have higher expenditures than those intermittently insured and uninsured throughout the year.

Statistical Analyses

In order to determine the relationship between comorbid depression or anxiety and health care expenditures in pulmonary and cardiac patients, separate log-linear multiple regressions were used for pulmonary patients and cardiac patients, with total health care expenditures and medical expenditures as separate outcomes. Demographics, socioeconomic factors, physical and mental health status, insurance status, and number of comorbid conditions were control variables in each analysis. For significant results, smearing estimation was used to determine differences between groups in dollars.

Next, the relationship between mental health treatment and health care expenditures in pulmonary or cardiac patients with depression or anxiety were determined with separate log-linear multiple regressions. Demographics, socioeconomic factors, physical and mental health status, insurance status, and number of comorbid conditions were control variables in each analysis. Smearing estimation was employed for significant results to obtain group differences in dollars.

Finally, the relationship between mental health treatment and health care utilization in pulmonary or cardiac patients with depression or anxiety were determined with separate negative binomial regressions. The health care utilization variables were number of office-based provider visits, number of outpatient hospital visits, number of inpatient nights at discharge, and number of emergency room visits. Again, demographics, socioeconomic factors, physical and mental health status, insurance status, and number of comorbid conditions were control variables in each analysis.

For each of the above analyses, Stata statistical software was used (StataCorp, 2002). Sample weights were employed to take into account the MEPS sampling procedures and to produce nationally representative estimates.

CHAPTER 3
RESULTS

Pulmonary Conditions

Comorbidity and Expenditures

Participant characteristics. The pulmonary sample used to determine the relationship between comorbid depression or anxiety and health care expenditures consisted of 7,866 respondents. In the sample, 649 respondents had depression and 358 respondents had anxiety (see Table 3-3 for descriptive statistics).

Results. To determine the relationship between comorbid depression or anxiety and total health care expenditures after adjusting for demographics (age, sex, race/ethnicity), socioeconomic status (years of education and income), insurance status, and illness severity (perceived physical and mental health status, and comorbid conditions), a log-linear multiple regression was conducted. A significant positive relationship between the presence of depression in pulmonary patients and total health care expenditures was found ($t = 2.60$, $p = .01$), but anxiety was not significantly related to total health care expenditures ($t = 1.29$, $p = 0.10$). That is, total health care expenditures of the group with comorbid depression was $8,338.52 more than the group without depression (see Table 3-7). Despite non-significance, the total health care expenditures for the group with comorbid anxiety was $12,307 more than the group without anxiety.

To determine the relationship between comorbid depression or anxiety and medical expenditures after adjusting for demographics (age, sex, race/ethnicity), socioeconomic status (years of education and income), insurance status, and illness severity (perceived

physical and mental health status, and comorbid conditions), a log-linear multiple regression was conducted. A significant negative relationship between the presence of anxiety and medical expenditures only was found ($t = -1.91$, $p = 0.03$), whereas the presence of depression yielded a non-significant relationship to medical expenditures only ($t = -.56$, $p = .29$). That is, medical expenditures for the group with comorbid anxiety was $3,331.77 less than the group without anxiety (see Table 3-8). Although not statistically significant, the medical expenditures for the group with comorbid depression was $3,123 less than the group without comorbid depression.

Depression Treatment and Expenditures

Participant characteristics. The sample used to determine the relationship between treatment of depression and health care expenditures was 649 respondents with a pulmonary condition and depression. In the sample, 100 respondents received mental health treatment (see Table 3-4 for sample characteristics).

Results. To determine the relationship between depression treatment and total health care expenditures after adjusting for demographics (age, sex, race/ethnicity), socioeconomic status (years of education and income), insurance status, illness severity (perceived physical and mental health status, and comorbid conditions), and anxiety treatment, a log-linear multiple regression was conducted. The relationship between depression treatment and total health care expenditures was non-significant ($t = .54$, $p = .30$) (see Table 3-7). The group who received depression treatment cost $13,752, whereas the group who had not received depression treatment cost $5,413.

To determine the relationship between depression treatment and medical expenditures only after adjusting for demographics (age, sex, race/ethnicity), socioeconomic status (years of education and income), insurance status, illness severity

(perceived physical and mental health status, and comorbid conditions), and anxiety treatment, a log-linear multiple regression was conducted. A significant negative relationship between depression treatment and medical expenditures only was found ($t = -3.31$, $p = .00$). That is, with depression treatment, medical expenditures decreased by $6,208.39 (see Table 3-8).

Depression Treatment and Health Care Utilization

Using the same sample of pulmonary condition respondents with comorbid depression, the relationships between depression treatment and various measures of health care utilization (number of office-based provider visits, outpatient hospital visits, inpatient nights, and emergency room visits) were determined (see Table 3-9).

Office-based provider visits results. To determine the relationship between depression treatment and number of office-based provider visits after adjusting for demographics (age, sex, race/ethnicity), socioeconomic status (years of education and income), insurance status, illness severity (perceived physical and mental health status, and comorbid conditions), and anxiety treatment, a negative binomial regression was conducted. The relationship between depression treatment and number of office-based provider visits was non-significant ($t = -.17$, $p = .43$). The treatment group had 12.66 office-based provider visits, whereas the non-treatment group had 13.26 visits.

Outpatient hospital visits results. To determine the relationship between depression treatment and number of outpatient hospital visits after adjusting for demographics (age, sex, race/ethnicity), socioeconomic status (years of education and income), insurance status, illness severity (perceived physical and mental health status, and comorbid conditions), and anxiety treatment, a negative binomial regression was conducted. The relationship between depression treatment and number of outpatient

hospital visits was non-significant (t = .55, p = .29). The treatment group had 1.67 outpatient hospital visits, whereas the non-treatment group had 2.19 visits.

Inpatient nights results. To determine the relationship between depression treatment and number of inpatient nights after adjusting for demographics (age, sex, race/ethnicity), socioeconomic status (years of education and income), insurance status, illness severity (perceived physical and mental health status, and comorbid conditions), and anxiety treatment, a negative binomial regression was conducted. The relationship between depression treatment and number of inpatient nights was non-significant (t = -.11, p = .45). The group that received depression treatment had an average of 1.18 inpatient nights, whereas the group who did not receive treatment had an average of 1.49 inpatient nights.

Emergency room results. To determine the relationship between depression treatment and number of emergency room visits after adjusting for demographics (age, sex, race/ethnicity), socioeconomic status (years of education and income), insurance status, illness severity (perceived physical and mental health status, and comorbid conditions), and anxiety treatment, a negative binomial regression was conducted. The relationship between depression treatment and number of emergency room visits was non-significant (t = -.13, p = .45). The group who had received depression treatment had .37 emergency room visits, whereas the group who had not received depression treatment had .47 emergency room visits.

Anxiety Treatment and Expenditures

Participant characteristics. The sample used to determine the relationship between anxiety treatment and expenditures had 358 respondents with pulmonary

conditions and anxiety. In the sample, there were 60 respondents who received mental health treatment (see Table 3-4 for sample characteristics).

Results. To determine the relationship between anxiety treatment and total health care expenditures after adjusting for demographics (age, sex, race/ethnicity), socioeconomic status (years of education and income), insurance status, illness severity (perceived physical and mental health status, and comorbid conditions), and depression treatment, a log-linear multiple regression was conducted. A significant positive relationship between anxiety treatment and total health care expenditures was found ($t = 1.83$, $p = .04$). That is, the group who received treatment for anxiety had $4,442 more total expenditures than the group who had not received treatment (see Table 3-7).

To determine the relationship between anxiety treatment and medical expenditures only after adjusting for demographics (age, sex, race/ethnicity), socioeconomic status (years of education and income), insurance status, illness severity (perceived physical and mental health status, and comorbid conditions), and depression treatment, a log-linear multiple regression was conducted. The relationship between anxiety treatment and medical expenditures only was non-significant ($t = -.92$, $p = .18$) (see Table 3-8). Although statistically non-significant, the group who received anxiety treatment had $3,209 total health care expenditures less than the group who had not received anxiety treatment.

Anxiety Treatment and Health Care Utilization

Using the same sample of pulmonary condition respondents with comorbid anxiety, the relationships between anxiety treatment and various measures of health care utilization (number of office-based provider visits, outpatient hospital visits, inpatient days, and emergency room visits) were determined (see Table 3-9).

Office-based provider visits results. To determine the relationship between anxiety treatment and number of office-based provider visits after adjusting for demographics (age, sex, race/ethnicity), socioeconomic status (years of education and income), insurance status, illness severity (perceived physical and mental health status, and comorbid conditions), and depression treatment, a negative binomial regression was conducted. The overall model in this analysis was non-significant ($F = 1.23$, $p = .29$).

Outpatient hospital visits results. To determine the relationship between anxiety treatment and number of outpatient hospital visits after adjusting for demographics (age, sex, race/ethnicity), socioeconomic status (years of education and income), insurance status, illness severity (perceived physical and mental health status, and comorbid conditions), and depression treatment, a negative binomial regression was conducted. There was a significant negative relationship between anxiety treatment and the number of outpatient hospital visits ($t = -2.96$, $p = .00$). The incidence rate of outpatient hospital visits was .39 times lower with anxiety treatment.

Inpatient nights results. To determine the relationship between anxiety treatment and number of inpatient nights after adjusting for demographics (age, sex, race/ethnicity), socioeconomic status (years of education and income), insurance status, illness severity (perceived physical and mental health status, and comorbid conditions), and anxiety treatment, a negative binomial regression was conducted. The relationship between anxiety treatment and number of inpatient nights was non-significant ($t = 1.03$, $p = .15$). The number of inpatient nights was 1.49 for the group that received anxiety treatment, whereas the group who had not received anxiety treatment had 1.16 visits.

Emergency room results. To determine the relationship between anxiety treatment and number of emergency room visits after adjusting for demographics (age, sex, race/ethnicity), socioeconomic status (years of education and income), insurance status, illness severity (perceived physical and mental health status, and comorbid conditions), and depression treatment, a negative binomial regression was conducted. The relationship between anxiety treatment and the number of emergency room visits was non-significant ($t = -.21$, $p = .42$). The group who had received anxiety treatment had .48 emergency room visits and the group who had not received anxiety treatment had .52 visits.

Cardiac Conditions

Comorbidity and Expenditures

Participant characteristics. The cardiac conditions sample used to determine the relationship between comorbid depression or anxiety and health care expenditures consisted of 2,403 respondents. In the sample, 293 respondents had depression (see Table 3-5 for sample characteristics).

Results. To determine the relationship between comorbid depression or anxiety and total health care expenditures after adjusting for demographics (age, sex, race/ethnicity), socioeconomic status (years of education and income), insurance status, and illness severity (perceived physical and mental health status, and comorbid conditions), a log-linear multiple regression was conducted. The relationship between the presence of depression and total health care expenditures was non-significant ($t = 1.30$, $p = .10$), as was the relationship between anxiety and total health care expenditures ($t = 1.30$, $p = .10$) (see Table 3-10). The depressed group cost $969 more than the non-depressed group, and the anxiety group cost $5,186 more than the non-anxiety group.

To determine the relationship between comorbid depression or anxiety and medical expenditures only after adjusting for demographics (age, sex, race/ethnicity), socioeconomic status (years of education and income), insurance status, and illness severity (perceived physical and mental health status, and comorbid conditions), a log-linear multiple regression was conducted. The relationship between the presence of depression and medical expenditures only was non-significant ($t = -.87$, $p = .19$), as was the relationship between anxiety and total health care expenditures ($t = .41$, $p = .34$) (see Table 3-11). The depressed group cost $8,339 more than the non-depressed group, and the anxiety group cost $313 more than the non-anxiety group.

Depression Treatment and Expenditures

Participant characteristics. The sample used to determine the relationship between treatment of depression and health care expenditures was 293 respondents with cardiac conditions and depression. In the sample, 34 respondents had mental health treatment for depression (see Table 3-6 for sample characteristics).

Results. To determine the relationship between depression treatment and total health care expenditures after adjusting for demographics (age, sex, race/ethnicity), socioeconomic status (years of education and income), insurance status, illness severity (perceived physical and mental health status, and comorbid conditions), and anxiety treatment, a log-linear multiple regression was conducted. The relationship between depression treatment and total health care expenditures was non-significant ($t = -.08$, $p = .47$) (see Table 3-10). The group that received depression treatment cost $7,466 less than the group who had not received treatment.

To determine the relationship between depression treatment and medical expenditures only after adjusting for demographics (age, sex, race/ethnicity),

socioeconomic status (years of education and income), insurance status, illness severity (perceived physical and mental health status, and comorbid conditions), and anxiety treatment, a log-linear multiple regression was conducted. The relationship between depression treatment and medical expenditures only was non-significant ($t = -1.06$, $p = .15$) (see Table 3-11). The group who had received depression treatment cost $8,900 less than the group who had not received depression treatment.

Depression Treatment and Health Care Utilization

Using the same sample of cardiac condition respondents with comorbid depression, the relationships between depression treatment and various measures of health care utilization (number of office-based provider visits, outpatient hospital visits, hospital inpatient nights, and emergency room visits) were determined (see Table 3-12).

Office-based provider visits results. To determine the relationship between depression treatment and number of office-based provider visits after adjusting for demographics (age, sex, race/ethnicity), socioeconomic status (years of education and income), insurance status, illness severity (perceived physical and mental health status, and comorbid conditions), and anxiety treatment, a negative binomial regression was conducted. The relationship between depression treatment and number of office-based provider visits was non-significant ($t = .23$, $p = .41$). The group that received depression treatment had 14.81 office-based provider visits and the group that did not receive depression treatment had 14.99 visits.

Outpatient hospital visits results. To determine the relationship between depression treatment and number of outpatient hospital visits after adjusting for demographics (age, sex, race/ethnicity), socioeconomic status (years of education and income), insurance status, illness severity (perceived physical and mental health status,

and comorbid conditions), and anxiety treatment, a negative binomial regression was conducted. The relationship between depression treatment and number of outpatient hospital visits was non-significant ($t = -1.29$, $p = .10$). The group that received depression treatment had 1.16 outpatient hospital visits and the group who had not received treatment had 3.23 visits.

Inpatient nights results. To determine the relationship between depression treatment and number of inpatient nights after adjusting for demographics (age, sex, race/ethnicity), socioeconomic status (years of education and income), insurance status, illness severity (perceived physical and mental health status, and comorbid conditions), and anxiety treatment, a negative binomial regression was conducted. The relationship between depression treatment and inpatient nights was non-significant ($t = .16$, $p = .44$). The group who received depression treatment had 1.92 inpatient nights, whereas the group who had not received depression treatment had 1.81 inpatient night stays.

Emergency room results. To determine the relationship between depression treatment and number of emergency room visits after adjusting for demographics (age, sex, race/ethnicity), socioeconomic status (years of education and income), insurance status, illness severity (perceived physical and mental health status, and comorbid conditions), and anxiety treatment, a negative binomial regression was conducted. The overall model in this analysis was non-significant ($F = 1.67$, $p = .10$). The group who received depression treatment had 1.05 emergency room visits and the group who had not received depression treatment had .53 visits.

Anxiety Treatment and Expenditures

Participant characteristics. The sample used to determine the relationship between anxiety treatment and expenditures included 175 respondents with cardiac

conditions and anxiety. There were 19 respondents who received mental health treatment for anxiety (see Table 3-6 for sample characteristics).

Results. To determine the relationship between anxiety treatment and total health care expenditures after adjusting for demographics (age, sex, race/ethnicity), socioeconomic status (years of education and income), insurance status, illness severity (perceived physical and mental health status, and comorbid conditions), and depression treatment, a log-linear multiple regression was conducted. The relationship between anxiety treatment and total health care expenditures was non-significant ($t = .91$, $p = .19$) (see Table 3-10). The group who had received anxiety treatment cost $5,186 more than the group who had not received anxiety treatment.

To determine the relationship between anxiety treatment and medical expenditures only after adjusting for demographics (age, sex, race/ethnicity), socioeconomic status (years of education and income), insurance status, illness severity (perceived physical and mental health status, and comorbid conditions), and depression treatment, a log-linear multiple regression was conducted. The relationship between anxiety treatment and medical expenditures only was non-significant ($t = .91$, $p = .19$) (see Table 3-11). The group who had received anxiety treatment cost $11,292 more than the group who had not received treatment.

Anxiety Treatment and Health Care Utilization

Using the same sample of respondents with cardiac conditions and anxiety, the relationships between anxiety treatment and various measures of health care utilization (number of office-based provider visits, outpatient hospital visits, inpatient nights, and emergency room visits) were determined (see Table 3-12).

Office-based provider visits results. To determine the relationship between anxiety treatment and number of office-based provider visits after adjusting for demographics (age, sex, race/ethnicity), socioeconomic status (years of education and income), insurance status, illness severity (perceived physical and mental health status, and comorbid conditions), and depression treatment, a negative binomial regression was conducted. The relationship between anxiety treatment and number of office-based provider visits was non-significant ($t = -1.33$, $p = .10$). The group who received anxiety treatment had 9.98 office-based provider visits and the group who had not received treatment had 13.34 visits.

Outpatient hospital visits results. To determine the relationship between anxiety treatment and number of outpatient hospital visits after adjusting for demographics (age, sex, race/ethnicity), socioeconomic status (years of education and income), insurance status, illness severity (perceived physical and mental health status, and comorbid conditions), and depression treatment, a negative binomial regression was conducted. The relationship between anxiety treatment and number of outpatient hospital visits was non-significant ($t = 1.05$, $p = .15$). The group who received anxiety treatment had 1.21 outpatient hospital visits and the group who had not received anxiety treatment had .89 visits.

Inpatient nights results. To determine the relationship between anxiety treatment and number of inpatient nights after adjusting for demographics (age, sex, race/ethnicity), socioeconomic status (years of education and income), insurance status, illness severity (perceived physical and mental health status, and comorbid conditions), and anxiety treatment, a negative binomial regression was conducted. The relationship between

anxiety treatment and inpatient nights was non-significant (t = -.65, p = .26). The group that received anxiety treatment had 1.93 inpatient night stays, whereas the group who did not receive treatment had 2.21 inpatient night stays.

Emergency room results. To determine the relationship between anxiety treatment and number of emergency room visits after adjusting for demographics (age, sex, race/ethnicity), socioeconomic status (years of education and income), insurance status, illness severity (perceived physical and mental health status, and comorbid conditions), and depression treatment, a negative binomial regression was conducted. The relationship between anxiety treatment and number of emergency room visits was non-significant (t = -.97, p = .17). The group who received anxiety treatment had .44 emergency room visits and the group who did not receive treatment had .74 visits.

Table 3-1. Clinical Classification Codes and Diagnostic Categories.

Medical Condition	Classification Code	Clinical Classification Software Diagnosis Category
Pulmonary conditions	127	Chronic obstructive pulmonary disease and bronchiectasis
	128	Asthma
	129	Aspiration pneumonitis, food/vomitus
	130	Pleurisy, pneumothorax, pulmonary collapse
	131	Respiratory failure, insufficiency, arrest (adult)
	132	Lung disease due to external agents
	133	Other lower respiratory disease
	134	Other upper respiratory disease
Cardiac conditions	96	Heart valve disorders
	97	Peri-, endo-, and myocarditis, cardiomyopathy (except that caused by tuberculosis)
	100	Acute myocardial infarction
	101	Coronary atherosclerosis and other heart disease
	102	Nonspecific chest pain
	103	Pulmonary heart disease
	104	Other and ill-defined heart disease
	105	Conduction disorders
	106	Cardiac dysrhythmias
	107	Cardiac arrest and ventricular fibrillation
	108	Congestive heart failure, nonhypertensive

Table 3-2. Antidepressant and Anti-anxiety Medication Names.

Drug Class	Generic Name	Brand Name
Antidepressant	Imipramine	Tofanil
	Desipramine	Norpramin
	Amitriptyline	Elavil
	Nortriptyline	Aventyl, Pamelor
	Protriptyline	Vivacil
	Trimipramine	Surmontil
	Doxepin	Sinequan, Adapin
	Maprotiline	Ludiomil
	Amoxapine	Asendin
	Trazodone	Desyrel
	Fluoxetine	Prozac
	Bupropion	Wellbutrin
	Sertraline	Zoloft
	Paroxetine	Paxil
	Venlafaxine	Effexor
	Nefazodone	Serzone
	Fluvoxamine	Luvox
	Phenelzine	Nardil
	Tranylcypromine	Parnate
Anti-anxiety	Diazepam	Valium
	Chlordiazepoxide	Librium
	Flurazepam	Dalmane
	Azepam	Centrax
	Clorazepate	Tranxene
	Temazepam	Klonopin
	Lorazepam	Ativan
	Alprazolam	Xanax
	Oxazepam	Serax
	Triazolam	Halcyon
	Estazolam	ProSom
	Quazepam	Doral
	Zolpidem	Ambient
	Buspirone	BuSpar
	Hydroxyzine	Atarax, Vistaril
	Diphenhydramine	Benadryl
	Propanolol	Inderal
	Atenolol	Tenormin
	Clonidine	Catapres

Source: Handbook of Clinical Psychopharmacology for Therapists

Table 3-3. Descriptive Statistics of Pulmonary Respondents (Comorbidity)

Variables	No Depression	Depression Comorbidity	No Anxiety	Anxiety Comorbidity
N	7217	649	7508	358
Mean Age (SD)	33.14 (23.36)	46.81 (17.03)	33.72 (23.28)	45.86 (18.1)
Mean Yrs Education (SD)	9.78 (4.81)	11.82 (3.61)	9.88 (4.79)	11.47 (3.67)
Mean Income $	16,889	19,385	17,025	18,556
% Male	45.4	25.6	44.7	24.3
% Female	54.6	74.4	55.3	75.7
% Caucasian	80.7	86.9	80.9	88.3
% African American	14.1	9.0	14.0	7.3
% Asian	3.7	1.8	3.6	1.7
% Other	1.5	2.2	1.5	2.8
% Hispanic	22.6	19.0	22.7	14.0
% No Comorbidity	53.7	41.6	51.7	32.7
% One Comorbidity	41.5	46.4	41.9	46.4
% Two + Comorbidity	4.8	12.1	6.4	21.0
% Uninsured	9.5	8.0	9.6	5.6
% Intermittent Insured	14.1	13.7	14.1	14.2
% Insured	76.3	78.3	76.3	80.2
Modal Physical Health	Very Good	Good	Very Good	Good
Modal Mental Health	Excellent	Good	Excellent	Good

Table 3-4. Descriptive Statistics of Pulmonary Respondents (Treatment)

Variables	No Depression Treatment	Depression Treatment	No Anxiety Treatment	Anxiety Treatment
N	549	100	298	60
Mean Age (SD)	47.89 (16.94)	40.90 (16.37)	46.30 (17.76)	43.67 (19.74)
Mean Yrs Education (SD)	11.82 (3.57)	11.84 (3.85)	11.45 (3.69)	11.58 (3.60)
Mean Income $	19,139	20,737	18,913	16,780
% Male	25.9	24.0	23.8	26.7
% Female	74.1	76.0	76.2	73.3
% Caucasian	87.6	83.0	88.6	86.7
% African American	9.1	9.0	7.0	8.3
% Asian	1.5	4.0	1.7	1.7
% Other	1.8	4.0	2.7	3.3
% Hispanic	19.7	15.0	14.4	11.7
% No Comorbidity	40.1	50	30.9	41.7
% One Comorbidity	47.5	40	46.3	46.7
% Two + Comorbidity	12.4	10	22.8	11.6
% Uninsured	8.0	8.0	6.4	1.7
% Intermittent Insured	12.9	18.0	15.1	10.0
% Insured	79.1	74.0	78.5	88.3
Modal Physical Health	Good	Very Good	Good	Good/ Very Good
Modal Mental Health	Good	Good	Good	Fair

Table 3-5. Descriptive Statistics of Respondents with Cardiac Conditions (Comorbidity)

Variables	No Depression	Depression Comorbidity	No Anxiety	Anxiety Comorbidity
N	2110	293	2228	175
Mean Age (SD)	60.05 (19.45)	58.64 (16.95)	60.01 (19.15)	58.12 (19.38)
Mean Yrs Education (SD)	11.15 (3.69)	11.50 (3.50)	11.19 (3.69)	11.29 (3.43)
Mean Income $	20,500	16,602	20,377	15,542
% Male	48.3	31.4	47.4	30.9
% Female	51.7	68.6	52.6	69.1
% Caucasian	82.7	85.3	82.6	88.6
% African American	14.0	10.9	14.1	8.0
% Asian	2.1	2.0	2.2	1.1
% Other	1.1	1.7	1.1	2.3
% Hispanic	13.4	17.1	13.7	16.0
% No Comorbidity	42.8	33.1	40.6	28.0
% One Comorbidity	43.5	16.0	43.3	41.1
% Two + Comorbidity	13.7	19.4	16.0	30.8
% Uninsured	6.3	7.2	6.6	4.6
% Intermittent Insured	11.9	5.1	12.3	12.6
% Insured	81.8	78.2	81.2	82.9
Modal Physical Health	Good	Fair	Good	Good
Modal Mental Health	Good	Good	Good	Good

Table 3-6. Descriptive Statistics of Pulmonary Condition Respondents (Treatment)

Variables	No Depression Treatment	Depression Treatment	No Anxiety Treatment	Anxiety Treatment
N	259	34	156	19
Mean Age (SD)	59.03 (16.58)	40.9 (19.74)	58.88 (18.69)	40.90 (16.37)
Mean Yrs Education (SD)	11.48 (3.57)	11.58 (3.60)	11.40 (3.35)	11.84 (3.85)
Mean Income $	16,610	16,780	15,280	20,737
% Male	30.9	35.3	31.4	26.3
% Female	69.1	64.7	68.6	73.7
% Caucasian	84.9	88.2	87.8	94.7
% African American	11.6	5.9	9.0	0
% Asian	1.9	2.9	1.3	0
% Other	1.5	2.9	1.9	5.3
% Hispanic	17.0	17.6	17.3	5.3
% No Comorbidity	33.2	32.4	26.9	36.8
% One Comorbidity	46.7	52.9	41.0	42.1
% Two + Comorbidity	20.1	14.7	32.1	21.0
% Uninsured	6.9	8.8	5.1	0
% Intermittent Insured	15.1	11.8	12.2	15.8
% Insured	78.0	79.4	82.7	84.2
Modal Physical Health	Fair	Fair	Good	Fair
Modal Mental Health	Good	Fair	Good	Very Good

Table 3-7. Statistical Results of Pulmonary Condition Respondents (Total Expenditures)

	β	T	p-value	Predicted Expenditures ($)
Depression	.20	2.60	.01**	13,752
No Depression				5,413
Anxiety	.10	1.29	.10	17,848
No Anxiety				5,541
Depression Treatment	.10	.54	.30	13,752
No Depression Treatment				5,413
Anxiety Treatment	.33	1.83	.04**	10,696
No Anxiety Treatment				6,254

Table 3-8. Statistical Results of Pulmonary Condition Respondents (Medical Expenditures)

	β	T	p-value	Predicted Expenditures ($)
Depression	-.05	-.56	.29	7,089
No Depression				3,966
Anxiety	-.17	-1.91	.03**	8,347
No Anxiety				5,015
Depression Treatment	-.66	-3.31	.00**	2,722
No Depression Treatment				8,931
Anxiety Treatment	-.28	-.92	.18	6,140
No Anxiety Treatment				9,349

Table 3-9. Statistical Results of Pulmonary Condition Respondents (Health Care Utilization)

	Office-Based Provider Visits			
	Incidence Rate Ratio	Z	p-value	Predicted Visit Count
Depression Treatment	.98	-.17	.43	12.66
No Depression Treatment				13.26
Anxiety Treatment	.10	1.29	.10	14.33
No Anxiety Treatment				11.87
Outpatient Hospital Visits				
Depression Treatment	1.23	.55	.29	1.67
No Depression Treatment				2.19
Anxiety Treatment	.39	-2.96	.00**	.61
No Anxiety Treatment				1.28
Inpatient Nights at Discharge				
Depression Treatment	.96	-.11	.45	1.18
No Depression Treatment				1.49
Anxiety Treatment	1.48	1.03	.15	1.49
No Anxiety Treatment				1.16
Emergency Room Visits				
Depression Treatment	.97	-.13	.45	.37
No Depression Treatment				.47
Anxiety Treatment	.95	-.21	.42	.48
No Anxiety Treatment				.52

Table 3-10. Statistical Results of Cardiac Condition Respondents (Total Expenditures)

	β	T	p-value	Predicted Expenditures ($)
Depression	.13	1.30	.10	16,436
No Depression				15,467
Anxiety	.18	1.30	.10	24,047
No Anxiety				14,921
Depression Treatment	-.03	-.08	.47	9,475
No Depression Treatment				16,941
Anxiety Treatment	.35	.91	.19	18,881
No Anxiety Treatment				13,695

Table 3-11. Statistical Results of Cardiac Condition Respondents (Medical Expenditures)

	β	T	p-value	Predicted Expenditures ($)
Depression	-.11	-.87	.19	13,752
No Depression				5,413
Anxiety	.05	.41	.34	13,898
No Anxiety				13,585
Depression Treatment	-.40	-1.06	.15	5,181
No Depression Treatment				14,081
Anxiety Treatment	.41	.91	.19	22,077
No Anxiety Treatment				10,785

Table 3-12. Statistical Results of Cardiac Recipients (Health Care Utilization)

	Office-Based Provider Visits			
	Incidence Rate Ratio	Z	p-value	Predicted Visit Count
Depression Treatment	1.04	.23	.41	14.81
No Depression Treatment				14.99
Anxiety Treatment	.78	-1.33	.10	9.98
No Anxiety Treatment				13.34
Outpatient Hospital Visits				
Depression Treatment	.49	-1.29	.10	1.16
No Depression Treatment				3.23
Anxiety Treatment	1.77	1.05	.15	1.21
No Anxiety Treatment				.89
Inpatient Nights at Discharge				
Depression Treatment	1.05	.16	.44	1.92
No Depression Treatment				1.81
Anxiety Treatment	.72	-.65	.26	1.93
No Anxiety Treatment				2.21
Emergency Room Visits				
Depression Treatment	2.00	1.83	.04 (overall model not significant)	1.05
No Depression Treatment				.53
Anxiety Treatment	.66	-.97	.17	.44
No Anxiety Treatment				.74

CHAPTER 4
DISCUSSION

The present study examined the relationship between comorbid depression or anxiety and health care expenditures in pulmonary or heart patients. As expected, it was found that depression increased total expenditures in pulmonary patients, but there was no corresponding increase in medical expenditures only. Because medical expenditures only excluded any medical event associated with a psychological diagnosis, it appears that depressed patients may not use more medical services for their medical conditions, but perhaps they do use more psychological services. Depressed patients may have more diagnoses of other psychological conditions that prompt service-seeking.

Contrary to expectation, the presence of anxiety in pulmonary patients decreased medical expenditures only, but there was no difference in total expenditures. Thus, it appears that anxious pulmonary patients do not use more health care services overall and in fact, they seek less health care services for their medical conditions. This could be because their anxiety inhibits them from seeking needed care.

The main aim of the study was to examine the medical cost offset effect in pulmonary or heart patients who sought treatment for depression or anxiety. This analysis revealed that depressed pulmonary patients showed a cost offset effect, in that depressed patients who received mental health treatment showed a decrease in medical expenditures only. Further analysis revealed that this effect was not explained by a decrease in the number of outpatient hospital visits, inpatient hospital nights, office-based provider visits, or emergency room visits. Thus, this study suggests that the treatment of

pulmonary patients with comorbid depression would result in a cost offset effect not due to cost shifting from medical treatment to psychological treatment.

Anxious pulmonary patients who received mental health treatment showed an unexpected increase in total health care expenditures; however, there was a reduction in outpatient hospital visits, supporting the idea that added psychological care would show a reduction in health care utilization. The number of hospital inpatient nights, office-based provider visits, and emergency room visits were not significantly different between the treated and untreated groups. These results might suggest that anxiety patients are getting the psychological services they need and added care costs more, but because needed care is provided, utilization in the medical sector is reduced. Furthermore, treated patients may also be more apt to recognize their anxiety symptoms as part of a psychological disorder, as opposed to a medical problem.

Heart disease patients did not show any significant effects in any of the analyses. However, it should be noted that the number of heart disease patients who received psychological treatment was less than pulmonary patients, which limited the power of the results from the heart disease group. Nevertheless, in this study, the variation in observed cost-offset effects suggests that the issue of cost-offset may be complex and variable across different psychological and medical conditions.

Limitations

Several limitations of the present study should be considered. First, the data structure of MEPS seems to be unreliable. The present analysis included the years 1999 to 2002. A previous analysis using only the years 2000 to 2002 revealed different results. When 1999 was added, the results changed. Previous results showed a cost offset effect for both depression and anxiety treatment in pulmonary patients with comorbid

depression or anxiety, whereas the present results reveal a cost offset effect for only depression treatment in pulmonary patients. The addition of data from 1999 appeared to have changed the structure of the data set. Part of this instability could be due to cohort effects, as well as a difference in power to detect statistical significance. Second, only a relatively small number of patients received mental health treatment, particularly for the heart disease groups. There were only 19 and 34 heart disease respondents who received mental health treatment for anxiety and depression, respectively. Methodologically, this poses a difficulty in terms of reliable estimates. Third, the validity of diagnostic coding is somewhat questionable because data was obtained through self-report. Fourth, aggregating multiple classification codes and psychotropic medication with psychotherapy reduces the precision of the analysis. Fifth, treatment efficacy could not be determined from the data. Finally, it is important to remember the cross-sectional and correlational nature of the present analysis does not address causality.

Implications

The demonstration of cost offset effects has implications for the field of psychology and its utility in reducing or containing rising health care costs in America. Although psychologists would like to believe that a cost offset effect holds across medical conditions and psychological conditions, the present data suggests that the relationship between mental health treatment and cost offsets is not clear-cut. Using data from the MEPS is a useful way to examine potential cost offset effects for specific medical conditions because it provides large numbers of subjects, is nationally representative, and allows for both cross-sectional and longitudinal analyses. Results from further analyses on other medical conditions may help to further refine the nature of

cost offsets. Because the MEPS allows for longitudinal analyses, next steps would be to determine cost offsets longitudinally.

An argument is that using cost offset as the only measure of the value of psychological services is incomplete (Coyne and Thompson, 2003). Patients and families who make treatment gains for depression or anxiety and employers who observe increased productivity in their workers treated for depression or anxiety may feel that these benefits are worth the additional costs of psychological services. Thus, the effectiveness of treatment as measured by quality of life and work performance and attendance would be important outcomes to consider in addition to cost issues. Although treatment efficacy information is not available from the MEPS data, future research will need to address the important issue of effective treatment and cost offsets. However, the MEPS would allow for the analysis of employment variables relevant to the present discussion.

In conclusion, the present study provided preliminary results on the cost offset effects of specific medical and psychological populations. Results indicated that cost offset issues are complex and the future direction of cost offset research will be focused on teasing apart this complexity.

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BIOGRAPHICAL SKETCH

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