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Late Life Depression and Anxiety in Four Types of Medicare Advantage Plans: Comorbidity with other Medical Diseases and Resource Utilization

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Abstract

Background: The prevalence of anxiety and depression and associated medical co-morbidities and costs has not been studied across different types of Medicare Advantage plans that vary in their level of utilization management and patient costs.

Methods: A cross-sectional study of 74,290 older adults belonging to four different Universal American Medicare Advantage Plans was conducted, to estimate the period prevalence of depression and anxiety, the comorbidity between these disorders and major medical illnesses and associated costs.

Results: The prevalence of anxiety or depression ranged from 14.5% to 18.8% across four types of Medicare Advantage plans, with HMO members less likely to be identified than members from fee-for-service or preferred provider organizations. Regardless of the type of plan, there was a high degree of comorbidity between depression and anxiety and other medical conditions, and higher utilization of services and costs in members with these disorders.

Conclusions: A substantial prevalence of depression and anxiety disorders is present among older adult members of Medicare Advantage Plans and the presence of both disorders is associated with substantial medical comorbidity and costs. Clinicians in all care settings will encounter a substantial number of medically complex older adults with depression and anxiety, requiring close follow-up and coordination of care.

Keywords: Depression; Anxiety; Prevalence; Co-morbidity; Costs; Utilization

Introduction

The lifetime prevalence of depression and anxiety disorders in older adults has been estimated at 10.0% and 13.6% respectively in the National Comorbidity Survey Replication [1]. Twelve month prevalence estimates were 2.6% for depression and 7.0% for anxiety disorders in this community based study. These disorders have a significant impact on older adults' social, psychological and physical functioning [2-6]. While community based studies are helpful in estimating the population prevalence using structured diagnostic interviews, they do not provide information on the prevalence or treatment of these disorders in clinical health care settings that have different levels of utilization management and patient costs.

Specifically, financial incentives for physicians participating in different Medicare Advantage Plans vary which could impact how often mental disorders are addressed and treated by clinicians in managed care settings. Therefore, it is important to document observed variations in recognition and treatment patterns for mental disorders like depression and anxiety across alternative insurance arrangements. In the coming year, Medicare beneficiaries will need to make decisions about the type of Medicare Advantage plans to enroll in, making it helpful to understand whether the differences by plan type in the mechanisms for referrals to specialists and pre-certification procedures influence access to treatment for persons with mental disorders. Finally, from a policy perspective, differences in utilization and spending associated with mental disorders across health care delivery systems can inform decisions regarding the organizational structures, structure of reimbursement and delivery of mental health services.

While some studies have examined the prevalence and costs associated with these disorders within some types of managed care settings [7-10], none have focused specifically on older adults or the potential differences that may be present according to four different types of plans: Private Fee-For-Service (PFFS), Network Private Fee-For-Service (NPFFS), Preferred Provider Organizations (PPO) and Health Maintenance Organizations (HMO).

The comorbidity of depression and anxiety with other medical diseases is an important factor in the increased disability and costs associated with these disorders [3,11-14]. However, the association between comorbid depression and anxiety and other medical illnesses has usually not been examined in studies on this topic. Furthermore, whether the medical comorbidity associated with depression, anxiety or both disorders varies across different types of Medicare Advantage plans is unknown. Payment structure, referral patterns and patient costs could have an influence on the patterns of association between depression and anxiety disorders and other medical diseases when they receive care in different settings.

Depression and anxiety disorders have also been associated with increased non-psychiatric utilization of services and total healthcare costs [15-19]. However, little is known about whether the costs associated with these disorders and the utilization of medical resources by patients with these disorders also varies substantially according to different Medicare Advantage plans.

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Therefore the aims of the current study were to estimate the period prevalence of depression and anxiety disorders, the comorbidity between these disorders and major medical illnesses and the costs incurred according to the presence of these diagnoses in four types of Medicare Advantage insurance plans (HMO, PFFS, NPFFS, and PPO).

Methods

Sample

This was a retrospective, cross-sectional study of patients from Universal American Medicare Advantage (UAM MA) plans, who were continuously enrolled in 2012. Nine organizations from three geographical regions were included, consisting of 2 private fees for service (PFFS) plans, 2 non-network private fees for service plans (NPFFS), 3 health maintenance organizations (HMO) and 2 preferred provider organizations (PPO). Eligible subjects selected were aged 65 years and older with prescription drug coverage, resulting in 10,821 members from PFFS plans, 5,817 members from NPFFS plans, 44,713 HMO members and 12,939 PPO members.

Measures

Sociodemographic data on age, gender, type of plan and prescription drug coverage were obtained from a membership database maintained by UAM MA. Depression and anxiety disorders were identified from inpatient, outpatient, and carrier and behavioral health claims billed between January 1, 2012 thru December 31, 2012, using the ICD-9-CM codes shown in Table 1. Medical comorbidity scores were derived using the Elixhauser Comorbidity Scale diagnoses which are based on the ICD-9-CM codes in the claims [20]. Antidepressant use was determined from National Drug Codes (NDC) in the pharmacy claims, while medical resource utilization (physician office, ER, inpatient visits) and costs for medical services and medications were based on all claim types for services provided in 2012.

Statistical analysis

Sociodemographic and comorbid disease variables were summarized using frequencies and percentages or means and standard deviations for the four types of membership plans. Comparisons between plan types were based on analysis of variance for age, and logistic regression for the medical diseases, with each disease as the dependent variable, and indicators for plan type as the predictor variables. The period prevalence of depression and anxiety disorders was described using frequencies, percentages and 95% confidence intervals grouped by plan type. To compare the prevalence of these disorders across plan types, a multinomial logistic regression model was estimated with depression, anxiety, both disorders and no disorder as the dependent variable and indicators for type of plan (PFFS, NPFFS, HMO, PPO) included as independent variables, in addition to gender, age, and comorbidity score.

The associations between anxiety and depression disorders and other medical diseases were examined using logistic regression models, with each medical disease as the dependent variable and indicators for depression, anxiety or both disorders as the predictor variables. Separate models were estimated for each type of plan. Secondary analyses were then performed in which the prevalence of each medical disease was compared across plan types in members with depression, anxiety or both disorders separately.

For each type of plan, resource utilization (# of visits) was analyzed using negative binomial regression models, to account for those with no service use (zeroes) and the resulting skewed distribution of the outcome. Indicator variables for depression, anxiety and both disorders were entered as independent variables with adjustment for gender, age and comorbidity score. Finally, since some individuals incur no health care costs for some of the services, a two-part model, composed of a logistic model (which examines whether any services were consumed) and a generalized linear model (which examines the costs for those who consume services) with a gamma distribution and log link was used to obtain predicted costs, adjusted for age, gender and comorbidity.

All contrasts between plan types and type of disorder (i.e. depression versus neither disorder, etc.) were conducted at the .008 level of significance (Bonferroni adjustment=.05/6), and were carried out using SAS/STAT software, Version 9.3 of the SAS system and the *tpm* command module in the Stata Software package for the two-part models [21].

Anxiety	Description	ICD-9-CM Codes
	Anxiety state, unspecified	300.00
	Panic disorder without agoraphobia	t300.01
	Generalized anxiety disorder	300.02
	Other anxiety disorder	300.09
	Phobic disorders	300.20-300.29
	Adjustment disorder with anxiety	309.24
	Adjustment disorder with mixed anxiety and depressed mood	309.28
	Posttraumatic stress disorder	309.81
Depression		
	Major depressive disorder, single	296.2
	Major depressive disorder, recurrent	296.3
	Unspecified episodic mood disorder	296.90, 296.99
	Dysthymic disorder	300.4
	Adjustment reactions-depressed mood and prolonged depressive reaction	309.0-309.1
	Adjustment disorder with mixed anxiety and depressed mood	309.28
	Depressed disorder, not elsewhere classified	311

Table 1: Inclusion Diagnoses for Anxiety and Depression.

Results

During 2012, a total of 44,713 HMO members, 5,817 NPFFS members, 10,821 PFFS members and 12,939 PPO members enrolled in Universal American's Medicare Advantage plans met criteria for inclusion in the study. As shown in Table 2, the average age of members was 75 years across all plans and 58% were female. The most common medical conditions included hypertension (70.5%), diabetes (31.5%), chronic pulmonary disease (23.0%), cardiac arrhythmias (19.1%), hypothyroidism (18.6%), complicated hypertension (15.9%), renal disease (15.4%), peripheral vascular disorder (14.6%), complicated diabetes (14.3%), heart failure (12.0%) and fluid and electrolyte disorders (11.1%). Differences in the prevalence of medical comorbidities between HMO members and each of the other 3 plan types were present for a number of medical conditions. Specifically, cardiac arrhythmias, valvular disease, pulmonary circulation disease, hypertension, chronic pulmonary disease, diabetes, cancer, solid tumors, weight loss, electrolyte and fluid disorders and anemia were all significantly less frequent in HMO members, while complicated hypertension and diabetes and renal disease occurred more frequently in HMO members than those enrolled in the other 3 plan types. There were few differences in medical comorbidities among fee-for-service and PPO plans.

PLAN:	HMO		NPFFS		PFFS		PPO		Total	
Total Number Of Members	44,713		5,817		10,821		12,939		12,939	
Age in years, mean (± SD):	75.3 (6.7)		75.2 (6.7)		74.7 (6.6)		74.8 (6.6)		75.2 (6.7)	
	n	%	n	%	n	%	N	%	n	%
Age in groups:										
65-70	12725	28.5	1753	30.1	3717	34.3	4307	33.3	22,502	30.3
71-75	12675	28.3	1641	28.2	2926	27.0	3428	26.5	20,670	27.8
76-80	9366	20.9	1169	20.1	1984	18.3	2493	19.3	15,012	20.2
81-85	5999	13.4	735	12.6	1329	12.3	1666	12.9	9,729	13.1
86-103	3948	8.8	519	8.9	865	8.0	1045	8.1	6,377	8.6
Female Gender:	25658	57.4	3383	58.2	6252	57.8	7564	58.5	42,857	57.7
Elixhauser Medical Comorbidities:										
Heart failure	5340	11.9	780	13.4	1309	12.1	1486	11.5	8,915	12.0
Cardiac arrhythmias	7973	17.8	1256	21.6	2338	21.6	2649	20.5	14,216	19.1
Valvular disease	3921	8.8	619	10.6	1326	12.3	1608	12.4	7,474	10.1
Pulmonary circulation	1089	2.4	204	3.5	391	3.6	499	3.9	2,183	2.9
Peripheral vascular	6560	14.7	825	14.2	1575	14.6	1870	14.5	10,830	14.6
Hypertension	30194	67.5	4401	75.7	8163	75.4	9613	74.3	52,371	70.5
Hypertension, complicated	8464	18.9	711	12.2	1186	11.0	1415	10.9	11,776	15.9
Paralysis	592	1.3	81	1.4	113	1.0	108	0.8	894	1.2
	HMO		NPFFS		PFFS		PPO		Total	
Elixhauser Medical Comorbidities:	n		%		n		%		n	
Other Neurological	2454	5.5	379	6.5	717	6.6	749	5.8	4,299	5.8
Chronic pulmonary disease	9782	21.9	1450	24.9	2637	24.4	3231	25.0	17,100	23.0
Diabetes, uncomplicated	13421	30.0	2001	34.4	3660	33.8	4282	33.1	23,364	31.5
Diabetes, complicated	7421	16.6	605	10.4	1156	10.7	1408	10.9	10,590	14.3
Hypothyroidism	8229	18.4	1065	18.3	2064	19.1	2461	19.0	13,819	18.6
Renal failure	7689	17.2	780	13.4	1312	12.1	1622	12.5	11,403	15.4
Liver Disease	1458	3.3	194	3.3	423	3.9	484	3.7	2,559	3.4
Peptic Ulcer disease	579	1.3	81	1.4	131	1.2	136	1.1	927	1.3
AIDS/HIV	23	0.1	4	0.1	5	0.0	7	0.1	39	0.1
Lymphoma	308	0.7	54	0.9	92	0.9	115	0.9	569	0.8
Metastatic Cancer	488	1.1	92	1.6	181	1.7	197	1.5	958	1.3
Solid tumor w/o metastasis	3769	8.4	575	9.9	1323	12.2	1466	11.3	7,133	9.6
Rheumatoid arthritis / Collagen vascular diseases	2183	4.9	316	5.4	539	5.0	641	5.0	3,679	5.0
Coagulopathy	1455	3.3	204	3.5	350	3.2	401	3.1	2,410	3.2
Obesity	3292	7.4	456	7.8	1082	10.0	1217	9.4	6,047	8.1
Weight loss	1818	4.1	349	6.0	524	4.8	625	4.8	3,316	4.5
Fluid and electrolyte	4490	10.0	808	13.9	1379	12.7	1550	12.0	8,227	11.1
Blood loss anemia	512	1.1	89	1.5	134	1.2	146	1.1	881	1.2
Deficiency Anemia	2866	6.4	487	8.4	842	7.8	919	7.1	5,114	6.9
Alcohol abuse	470	1.1	72	1.2	112	1.0	167	1.3	821	1.1
Drug Abuse	476	1.1	47	0.8	83	0.8	84	0.6	690	0.9
Psychoses	952	2.1	196	3.4	286	2.6	320	2.5	1,754	2.4

[a]HMO=Health Maintenance Organization; NPFFS=Network Patient Fee-for-Service; PFFS=Patient Fee-for-Service; PPO=Preferred Provider Organization

Table 2: Characteristics of Universal American Members Aged 65 and Over by Type of Plan[a].

The prevalence of depressive and anxiety disorders is presented in Table 3 for each of the four plans. The presence of depression alone ranged from 7.2% in HMO members to 8.2% in network fee-for-service participants, while the prevalence of anxiety disorders ranged from 4.3% to 5.9%. Comorbid depression and anxiety were identified less frequently with 2.9% of HMO, 4.4% of PPO and 4.7% of fee-for-service members meeting criteria for both disorders. The only significant contrasts in the prevalence of these disorders among the 4 types of plans were the comparisons between HMO members and members of the other 3 plans, with a lower prevalence in the former for depression, anxiety and comorbid depression and anxiety.

Sample demographics and the most frequent medical conditions are shown in Table 4 according to the type of plan and the presence of a depression or anxiety diagnosis. Members with depression, anxiety or both disorders were more likely to be female when compared to the group with neither disorder, while age was similar across the four groups with the exception that HMO members with neither disorder tended to be older than those with depression or anxiety. Within each type of plan, there was a strong association between the presence of depression and anxiety and other medical illnesses as reflected in an increased prevalence of medical illnesses relative to those with neither disorder. The only exceptions were a lack of association between anxiety

	Depression	Anxiety	Depression & Anxiety
	n (%) [95% CI]	n (%) [95% CI]	n (%) [95% CI]
PLAN:			
HMO (N=44,713)	3,231 (7.2%)	1,933 (4.3%)	1,308 (2.9%)
	[7.0, 7.5]	[4.1, 4.5]	[2.8, 3.1]
Network-PFFS (N=5,817)	474 (8.2%)	342 (5.9%)	276 (4.7%)
	[7.5, 8.9]	[5.3, 6.5]	[4.2, 5.3]
PFFS (N=10.821)	848 (7.8%)	635 (5.9%)	505 (4.7%)
	[7.3, 8.3]	[5.4, 6.3]	[4.3, 5.1]
PPO (N=12,939)	975 (7.5%)	769 (5.9%)	566 (4.4%)
	[7.1, 8.0]	[5.5, 6.4]	[4.0, 4.7]
Contrasts: [a]	OR (95% CI)	OR (95% CI)	OR (95% CI)
HMO vs. NPFFS	.86 (.78, .95)	.71 (.63, .80)	.60 (.52, .69)
HMO vs. PFFS	.90 (.83, .97)	.72 (.65, .79)	.61 (.55, .68)
HMO vs. PPO	.93 (.87, 1.01)	.71 (.65, .77)	.65 (.59, .72)
NPFFS vs. PFFS	1.04 (.92, 1.17)	1.01 (.88, 1.16)	1.02 (.87, 1.19)
NPFFS vs. PPO	1.09 (.97, 1.22)	1.00 (.87, 1.14)	1.09 (.94, 1.27)
PFFS vs. PPO	1.04 (.95, 1.15)	.99 (.89, 1.11)	1.07 (.95, 1.22)

[a]: OR=Odds Ratio; CI=Confidence Interval

Table 3: Prevalence of Depression and Anxiety Disorders by Type of Plan.

	Neither Disorder	Anxiety	Depression	Depression & Anxiety
Total Number of Members:	n	n	n	N
HMO	38,241	1,933	3,231	1,308
NPFFS	4,725	342	474	276
PFFS	8,833	635	848	505
PPO	10,629	769	975	566
Age: Mean (SD)				
HMO	75.4 (6.6)	75.2 (6.9)	74.9 (6.7)	74.6 (6.7)
NPFFS	75.2 (6.7)	74.8 (6.7)	75.9 (7.3)	74.9 (6.5)
PFFS	74.7 (6.6)	74.9 (6.7)	75.2 (7.0)	74.6 (6.7)
PPO	74.8 (6.6)	74.9 (6.6)	75.3 (6.9	75.0 (6.8)
Female Gender:	%	%	%	%
HMO	54.6	73.3	73.0	78.1
NPFFS	54.6	71.1	71.9	79.4
PFFS	54.8	72.3	69.0	72.9
PPO	55.3	74.3	69.2	77.7
Heart Failure:	%	%	%	%
HMO	10.7	18.2	18.8	22.9
NPFFS	11.4	17.0	21.5	30.1
PFFS	10.4	15.9	19.5	25.0
PPO	10.0	15.5	18.8	21.2
Cardiac Arrhythmias:	%	%	%	%
HMO	16.3	29.0	24.0	29.6
NPFFS	19.3	29.5	29.1	38.0
PFFS	19.6	28.5	27.0	39.4
PPO	18.6	28.1	26.6	34.5
Peripheral Vascular:	%	%	%	%
HMO	13.5	20.4	21.7	22.3
NPFFS	12.2	17.5	27.2	21.4
PFFS	12.8	18.9	22.6	26.3
PPO	13.0	16.5	22.9	25.1
	Neither Disorder	Anxiety	Depression	Depression & Anxiety
Hypertension, uncomplicated:	%	%	%	%
HMO	65.1	83.4	80.7	83.9
NPFFS	73.3	86.8	84.8	86.6
PFFS	73.4	82.8	84.1	86.5
PPO	72.5	80.6	83.4	83.4
Hypertension, complicated:	%	%	%	%
HMO	17.5	25.9	28.2	27.8
NPFFS	11.4	10.8	16.0	21.0
PFFS	10.1	11.0	14.9	19.4
PPO	10.2	13.0	15.7	14.5
Chronic Pulmonary Disease:	%	%	%	%
HMO	19.7	33.6	33.0	41.9
NPFFS	21.6	36.3	38.2	45.7
PFFS	21.5	35.6	34.2	44.4
PPO	22.2	36.0	34.6	45.6
Diabetes, uncomplicated:	%	%	%	%
HMO	29.3	29.7	36.4	34.8
NPFFS	33.3	33.0	44.3	38.0
PFFS	33.1	32.6	39.6	38.8
PPO	32.6	32.2	38.5	34.1
Diabetes, complicated:	%	%	%	%
HMO	15.9	16.8	23.6	19.6
NPFFS	9.6	8.5	16.9	15.2
PFFS	10.0	10.9	15.0	15.2
PPO	10.2	12.0	16.1	12.4
Hypothyroidism:	%	%	%	%
HMO	16.6	25.5	29.5	32.0
NPFFS	16.8	22.2	24.5	29.3
PFFS	17.6	25.2	24.6	27.9
PPO	17.6	25.1	25.3	26.7
Renal Failure:				
HMO	16.3	19.7	24.6	22.9
NPFFS	12.5	12.3	20.3	19.2
PFFS	11.3	13.1	16.4	19.0
	Neither Disorder	Anxiety	Depression	Depression & Anxiety
Renal Failure:				
PPO	11.7	13.5	18.3	17.1
Fluid and Electrolyte Disorders:				
HMO	8.3	19.1	18.0	28.4
NPFFS	10.9	22.2	25.9	34.4
PFFS	10.0	19.8	21.8	36.8
PPO	9.6	19.0	21.2	30.9

Table 4: Demographic and Medical Comorbidities by Type of Plan and Diagnosis.

and neither disorder on complicated hypertension, diabetes and renal disease for most of the plans and for those with both disorders for diabetes. Most notable are the high proportion of members diagnosed with both comorbid medical diseases and comorbid anxiety and depression. Among those with both depression and anxiety, 85% also had hypertension; approximately 45% had chronic pulmonary disease, 30 to 39% with cardiac arrhythmias, 28 to 37% with fluid and electrolyte disorders, 27 to 32% hypothyroidism and 21 to 30% with heart failure. Also of interest, there was a similar prevalence of medical conditions for those with depression alone when compared to members with anxiety alone for the majority of illnesses, suggesting that these

disorders are associated with an equal amount of comorbidity with other medical conditions. The only exceptions were a higher prevalence of diabetes, renal disease (except in PFFS setting), peripheral vascular disease (NPFFS, PPO only) and hypothyroidism (HMO) in those with depression, while cardiac arrhythmias were more prevalent in those with anxiety disorders (HMO).

In addition to these within plan comparisons we also examined whether the medical comorbidity associated with depression or anxiety differed according to the type of Medicare Advantage plan. Specifically, within each diagnostic group (i.e. depression, anxiety, both) we determined whether the co-occurrence of medical illnesses varied by plan.

First, the co-occurrence of depression and complicated hypertension, complicated diabetes and renal disease was higher in HMO members than those in the other plans, while peripheral vascular disorders, diabetes and fluid and electrolyte disorders co-occurred less frequently in HMO than NPFFS members. Finally, hypothyroidism also co-occurred more frequently in HMO than PFFS members among those with depression. The co-occurrence of anxiety disorders with other medical illnesses was similar across plans with the exception being a higher co-occurrence with complicated hypertension, complicated diabetes and renal disease in HMO members. Finally, the co-occurrence of comorbid depression and anxiety with other medical illnesses was higher in HMO Members for complicated hypertension (vs. PFFS, PPO), complicated diabetes (vs. PPO), and renal disease (vs. PPO), while being less likely to have cardiac arrhythmias (vs. NPFFS, PFFS) and fluid and electrolyte disorders (vs. PFFS). The only other difference for those with both anxiety and depression was a higher association with heart failure in NPFFS versus PPO members.

Table 5 presents information on antidepressant treatment use and utilization of healthcare services according to plan type and diagnosis. From 76% to 85% of the members with a diagnosis of depression or comorbid depression and anxiety received antidepressant treatment during 2012. A substantial number of those with anxiety alone were also prescribed these medications ranging from 34% to 41% of members. As expected use was the lowest for those without either disorder, ranging from 10% to 14% across plans.

As shown in Table 5, utilization of health services, including inpatient admissions, emergency room visits and office visits was significantly higher among those with depression and anxiety disorders compared to those with neither disorder across all plans, based on the negative binomial models of the number of admissions and visits. Utilization was particularly high in the group with comorbid depression and anxiety. For example, from 38% to 45% of this group had two or more ER visits compared to 8% to 10% in the group with no disorder, and the median number of office visits (Median=7 to 9) was almost twice the number in the no disorder group (median=4).

When those with depression, anxiety or both disorders were compared, members with both disorders had more inpatient admits, emergency room visits and office visits (HMO & NPFFS only) than those with depression alone. They also had significantly more inpatient admissions (NPFFS and PPO only) and emergency room visits (PPO alone) than those with anxiety alone. Interestingly, members with anxiety were more likely to be admitted to the emergency room than members with depression, and had more office visits when compared to those with depression and both disorders.

Table 6 presents the unadjusted healthcare costs in participants with depression, anxiety or both disorders by type of plan. Members with both depression and anxiety had the highest total costs ($20,000 to $24,000), followed by those with depression ($14,000 to $20,000), anxiety ($13,000 to $15,000) and neither disorder ($7,000 to $8,000). A similar pattern was present for inpatient, emergency room costs and pharmacy costs. Due to the large number of members with no costs for some of the services and the skewed nature of the cost data, statistical comparisons between diagnostic groups were based on a two-part model that takes into account the probability of using a service and the cost of the service.

The results of these analyses are presented in Table 7 as the predicted costs for each type of service, adjusted for age, gender and medical comorbidity. Parallel to the findings on utilization, health care costs were significantly higher among those with depression or anxiety disorders compared to those with neither disorder. Patients with both disorders had predicted total costs that were $4,000 to $7,000 higher than members without these disorders, while members with depression or anxiety had total costs ranging from $2,000 to $4,000 higher. Inpatient costs and emergency room costs followed a similar pattern of cost differences, while pharmacy costs for members with anxiety alone did not differ from those with neither disorder.

Discussions

To our knowledge there have been no previous studies focused on the prevalence of depression, anxiety or both disorders among older adults in four different types of Medicare Advantage insurance plans. This study found a substantial prevalence of depression or anxiety ranging from 14.5 % to 18.8% across settings and that the prevalence of these disorders was significantly lower in the HMO setting. There were no differences in prevalence between the other 3 settings (i.e. NPFFS, PFFS, and PPO). Thomas et al., found a 21.3% prevalence of depression or anxiety disorders, higher than in this study, most likely due to the fact that their sample was based on members of a Medicaid health maintenance organization who had both medical and behavioral health coverage [9]. Unutzer et al. 2009 found that 14.1% of medically ill members of a fee-for-service program had a diagnosis of depression, compared to 12.5% to 12.9% with depression for fee-for-service members in this study, but their sample was restricted to members with diabetes mellitus or heart failure, which would explain the slightly higher prevalence [16]. While, McLaughlin et al. studied the overlap of anxiety and depressive disorders in a managed care population, they utilized a case-control study design, which precludes the estimation of prevalence rates [7]. We could find no other studies addressing the prevalence of depression and anxiety or both disorders across different types of managed care settings.

While the prevalence of depression and anxiety was lower in HMO members in this study, we found that regardless of the type of setting there was a high degree of comorbidity between these disorders and other medical conditions. Most noteworthy was the particularly high prevalence of hypertension, chronic pulmonary disease, cardiac arrhythmias, hypothyroidism and heart failure in members with both depression and anxiety, suggesting that the impact of having both diseases is greater than that of either disease alone. In addition, depression and anxiety disorders were associated with a similar degree of comorbid disease, suggesting that both types of disorders need to be addressed in the evaluation and management of older adult patients.

When we examined whether the medical comorbidity associated with depression and anxiety alone varied across the type of plan we found few consistent differences, similar to the findings of Wells et al. (1991) in the Medical Outcomes study [22]. The exception to this was

	Neither Disorder			Anxiety			Depression			Depression & Anxiety		
Antidepressant Use:	No	Yes		No	Yes		No	Yes		No	Yes	
HMO	88.1%	11.9%		65.8%	34.3%		22.8%	77.2%		20.3%	79.7%	
NPFFS	86.2%	13.8%		59.1%	40.9%		20.2%	79.8%		14.9%	85.1%	
PFFS	88.1%	11.9%		61.4%	38.6%		22.3%	77.7%		23.0%	77.0%	
PPO	89.7%	10.3%		60.9%	39.1%		24.2%	75.8%		20.3%	79.7%	
Inpatient Admissions:	0	1	2+	0	1	2+	0	1	2+	0	1	2+
HMO	88.7%	8.7%	2.6%	74.8%	16.6%	8.6%	73.4%	18.0%	8.7%	61.6%	23.2%	15.2%
NPFFS	85.9%	10.7%	3.4%	71.9%	20.2%	7.9%	64.1%	20.3%	15.6%	47.5%	28.3%	24.3%
PFFS	86.5%	10.4%	3.1%	73.7%	16.2%	10.1%	67.5%	20.8%	11.8%	50.9%	24.8%	24.4%
PPO	86.9%	9.7%	3.4%	72.8%	17.2%	10.0%	70.2%	19.7%	10.2%	56.0%	23.3%	20.7%
Emergency Room Visits:	0	1	2+	0	1	2+	0	1	2+	0	1	2+
HMO	74.8%	15.8%	8.0%	48.9%	23.6%	27.5%	54.7%	23.0%	22.3%	38.9%	23.6%	37.5%
NPFFS	72.2%	17.5%	10.2%	47.7%	27.5%	24.9%	46.0%	24.5%	30.0%	33.3%	21.4%	45.3%
PFFS	74.6%	16.0%	9.4%	52.1%	19.8%	28.0%	52.1%	22.3%	25.6%	36.6%	23.4%	40.0%
PPO	75.8%	15.2%	9.0%	56.1%	20.6%	23.4%	54.8%	22.1%	23.2%	38.5%	23.1%	38.3%
	25%tile	Median	75%tile	25%tile	Median	75%tile	25%tile	Median	75%tile	25%tile	Median	75%tile
Office Visits:												
HMO	1	4	8	4	8	13	4	7	12	5	9	14
NPFFS	2	4	8	4	7	12	3	6	11	5	8	13
PFFS	2	4	8	4	7	11	3	6	10	4	8	13
PPO	2	4	7	3	6	11	3	6	10	3	7	10

Table 5: Antidepressant Treatment and Utilization of Health Care Services by Type of Plan and Disorder.

	Neither Disorder			Anxiety			Depression			Depression & Anxiety		
	Mean	Median	S.D.	Mean	Median	S.D.	Mean	Median	S.D.	Mean	Median	S.D.
Total Costs:												
HMO	6,877	2,898	14,023	13,085	5,712	22,739	13,725	6,201	24,201	20,102	9,123	39,740
NPFFS	7,733	2,899	16,959	14,674	6,439	22,895	20,070	8,494	28,214	24,797	15,367	28,928
PFFS	7,141	3,018	13,842	13,354	5,374	21,295	16,266	7,092	23,945	23,771	11,632	30,456
PPO	7,268	2,890	14,696	13,441	5,814	22,613	16,433	6,813	26,829	22,506	11,643	30,552
Inpatient Costs:												
HMO	1,791	0	8,046	4,629	0	14,400	4,874	0	16,889	8,421	0	31,131
NPFFS	2,170	0	9,746	4,637	0	11,544	7,088	0	16,921	9,538	2,910	18,971
PFFS	1,721	0	6,905	4,768	0	14,216	5,430	0	13,692	9,762	2,635	18,657
PPO	2,012	0	8,362	4,806	0	14,997	5,122	0	14,847	9,582	0	20,754
Emergency Room Costs:												
HMO	124	0	345	359	18	624	274	0	493	516	213	925
NPFFS	138	0	352	348	58	631	349	133	517	585	305	866
PFFS	113	0	291	318	0	633	294	0	517	493	234	745
PPO	113	0	316	272	0	467	254	0	446	489	201	727
Pharmacy Costs:												
HMO	1,641	968	3,442	2,118	1,380	4,248	2,491	1,808	3,695	2,757	1,919	3,957
NPFFS	1,329	688	2,489	1,936	1,155	3,148	2,477	1,539	3,520	2,953	2,130	3,727
PFFS	1,588	801	3,961	2,057	1,247	3,345	2,424	1,676	3,181	2,780	1,811	3,422
PPO	1,612	727	4,051	2,418	1,314	5,052	2,945	1,728	4,957	2,933	2,064	3,476

Table 6: Health Care Costs by Type of Plan and Disorder.

a higher prevalence of complicated hypertension, complicated diabetes and renal disease in HMO members with depression or anxiety when compared to members in the other three settings.

This study confirms previous findings in managed care populations of higher utilization of services and healthcare costs in those with depression and anxiety disorders. Regardless of the structure of management we found greater healthcare costs associated with these disorders when compared to those without these disorders. In addition, the highest costs were observed in those with both depression and anxiety.

There are limitations to the current study that should be mentioned. The diagnoses of depression or anxiety disorders were based on claims, reflecting only those services billed, which could result in underestimating the prevalence of these disorders. Alternatively, some members may have been falsely identified as having depression or anxiety. However the high percentage of those with depression being treated suggests that members identified with these disorders were experiencing a substantial number of symptoms. We did not have data to examine the adequacy of antidepressant therapy and whether the higher utilization and costs among members with depression

	Neither Disorder		Anxiety			Depression			Depression & Anxiety		
	Cost		Cost	Costa Difference	p-value	Cost	Costa Difference	p-value	Cost	Costa Difference	p-value
Total Costs:											
HMO	8,262		10,575	2,312	<.001	10,471	2,209	< .001	12,416	4,154	< .001
NPFFS	10,181		14,328	4,147	<.001	14,452	4,271	<.001	17,409	7,227	< .001
PFFS	9,497		12,503	3,006	< .001	13,630	4,132	< .001	14,069	4,572	< .001
PPO	9,573		12,512	2,939	< .001	13,474	3,901	< .001	16,394	6,821	< .001
Inpatient Costs:											
HMO	2,105		2,979	874	< .001	2,770	665	< .001	3,675	1,570	< .001
NPFFS	2,709		3,424	715	.081	3,825	1,115	.002	4,657	1,948	< .001
PFFS	2,155		3,541	1,386	<.001	3,342	1,187	< .001	4,401	2,246	< .001
PPO	2,441		3,333	892	.001	2,981	540	.013	4,842	2,401	< .001
Emergency Room Costs:											
HMO	138		261	122	< .001	184	46	< .001	314	176	< .001
NPFFS	159		282	123	< .001	235	76	< .001	354	195	< .001
PFFS	131		260	128	< .001	207	76	< .001	285	154	< .001
PPO	127		216	87	< .001	181	54	< .001	321	195	< .001
Pharmacy Costs:											
HMO	1,726		1,782	55	.495	2,037	310	< .001	2,049	323	.004
NPFFS	1,467		1,655	188	.166	1,931	464	.001	2,095	628	.001
PFFS	1,755		1,863	108	.503	2,113	357	.022	1,853	97	.583
PPO	1,802		2,126	324	.038	2,427	625	< .001	2,206	404	.029

Table 7: Predicted Health Care Costs by Type of Plan and Disorder.

and anxiety were associated with prescribing patterns or patients' compliance with treatment.

Finally, the cross-sectional design of this study does not allow us to determine the direction or causal nature of the high association between depression, anxiety and other medical conditions. While a different study design could help establish the direction of causality, what is apparent is that mental-physical comorbidity is clinically consequential; it complicates treatments prescribed, increases disability, mortality and economic burden. From a clinical point of view the co-occurrence of mental and physical disorders may be the critical issue in treating older adults presenting with these disorders rather than the question of which disorder came first. However, further research examining the predominate direction of these associations is also important for developing preventive strategies and furthering our understanding of the biological and psychosocial mechanisms underlying these relationships.

Strengths of this study include the large sample of members from four different managed care settings across three different geographical regions, which make the results generalizable to a broad population. The consistency of the main findings across four different settings also adds to the validity of the results and suggests that the specific management structure or type of organization does not have an appreciable effect on the relationships studied. Furthermore, while numerous studies have shown an increase in medical comorbidity associated with depression and anxiety alone, this study is unique in showing the negative impact of having both disorders.

In conclusion, this study documents a substantial prevalence of depression and anxiety disorders across four managed care settings and that the presence of these disorders is associated with increased medical comorbidity, utilization of services and healthcare costs. Clinicians in all care settings will encounter a substantial number of medically complex older adults with depression and anxiety disorders, requiring close follow-up and coordination of care.

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