ORIGINAL RESEARCH

Higher Costs and Therapeutic Factors Associated With Adherence to NCQA HEDIS Antidepressant Medication Management Measures: Analysis of Administrative Claims

REBECCA L. ROBINSON, MS; STACEY R. LONG, MS; STELLA CHANG, MPH; STEPHEN ABLE, PhD; ONUR BASER, PhD; ROBERT L. OBENCHAIN, PhD; and RALPH W. SWINDLE, PhD

ABSTRACT

OBJECTIVE: To determine if the type of antidepressant drug is related to adherence to National Committee for Quality Assurance (NCQA) Antidepressant Medication Management (AMM) quality measures and to assess the 6-month health care costs among newly diagnosed depressed patients.

METHODS: The MarketScan Commercial Claims and Encounter database for medical and pharmacy claims from January 2001 to September 2004 was used to assess adherence to the 3 AMM quality-of-care measures. AMM measures include (a) acute phase, the percentage of eligible members who remained on antidepressant medication continuously for 3 months after the initial diagnosis as determined by at least 84 days supply of antidepressant drugs during the first 114 days following receipt of the index antidepressant; (b) continuation phase, the percentage of eligible members who remained on antidepressant medication continuously for the 6 months after the initial diagnosis as determined by at least 180 days supply of antidepressants during the first 214 days following receipt of the index antidepressant; and (c) practitioner contacts, the percentage of members who received at least 3 follow-up office visits or telephone contacts with health care providers, including at least 1 contact with a practitioner licensed to prescribe (may not necessarily be the prescriber of the antidepressant). A fourth measure, overall adherence, was added, if all 3 AMM measures were met. Multivariate regression models determined demographic, clinical (such as receipt of mental health specialty care, the Charlson Comorbidity Index score, and co-occurring bipolar or schizophrenia), and therapy-related factors associated with outcomes of adherence and costs (paid amounts for insurance-reimbursable health care services for inpatient admissions, emergency department services, outpatient services, and outpatient prescription drugs). Health care expenditures (both total and mental-health-specific costs) were measured for each patient for 6 months following the date of service for the index antidepressant.

RESULTS: A total of 60,386 adult patients (10.7%) of 562,898 patients with a depression diagnosis met NCQA inclusion criteria in the AMM Technical Specifications (e.g., aged 18 years or older, newly diagnosed with depression and initiating antidepressant therapy, 365 days of continuous enrollment; patients were excluded if there were missing data on dose or quantity of index drug in pharmacy claims or initiated therapy on 2 or more antidepressants as the index medication, exclusion criteria not in the AMM Technical Specifications). Only 19% of patients achieved overall adherence. Rates for the 3 AMM measures were 39% for practitioner contacts, 65% for acute phase, and 44% for continuation phase. Receipt of mental health specialty care was the only factor that was positively associated with greater adherence on all 4 measures (overall measure: odds ratio [OR] = 3.895, 95% confidence interval [CI], 3.72-4.07; acute OR = 1.38, 95% CI, 1.33-1.43; continuation OR = 1.46, 95% CI, 1.41-1.51; contacts OR = 5.83, 95% CI, 5.62-6.06). Most patients were initiated on selective serotonin reuptake inhibitors (SSRIs, 69.5%), followed by venlafaxine (21.4%), tricyclic antidepressants (TCAs, 21.4%), bupropion (11.0%), and other antidepressants (e.g., mirtazapine, nefazadone, trazadone; 7.2%). Before adjustment for confounding factors, patients initiated on venlafaxine, TCAs, or other antidepressants had higher rates of adherence on the overall performance measure versus initiators on SSRIs, but the absolute differences were relatively small: 21.4% for venlafaxine and TCAs and 23.1% for other antidepressants versus 18.5% for SSRIs (P <0.001). Patients initiated on venlafaxine, TCAs, or other antidepressants were also more likely to receive care from a mental health specialist, 16.8%, 15.0%, and 54.8%, respectively, compared with SSRIs (13.0%, all P <0.001). Regression analysis showed that only venlafaxine had a higher OR (1.13; 95% CI, 1.05-1.22) compared with SSRIs for adherence on the overall measure. Initiating dose level was in the target range for 70.0% of all patients (24.9% were below target dose and 5.2% above target dose), and adherent patients on all 3 AMM measures were less likely than nonadherent patients (70.4% vs. 68.4%, P <0.001) to be initiated in the target dose range. After multivariate adjustment, the initiating dose (target vs. high) was a significant factor in explaining adherence to the overall measure (OR = 1.26; 95% CI, 1.16-1.37). Adherent patients had 6-month median unadjusted total health care expenses that were nearly 2 times higher compared with nonadherent patients ($5,169 vs. $2,734) and mental health expenditures that were nearly 3 times higher ($1,922 vs. $677). After adjustment, adherent patients compared with nonadherent patients incurred an additional $644 in mental health expenditures and $806 in overall health care expenditures in the 6 months following initiation of antidepressant therapy.

CONCLUSIONS: Only 19% of depressed patients initiated on antidepressants met all 3 criteria set forth in the NCQA Health Plan Employer Data and Information Set (HEDIS) AMM quality-of-care performance measures. Receipt of mental health specialty care was the single factor most strongly associated with quality treatment by these measures. Type and dosage level of initial antidepressant was associated with adherence to the NCQA HEDIS AMM measures, but the absolute difference in rates of adherence were relatively small among types of antidepressants. Costs were higher for guideline-adherent individuals in the 6 months following treatment initiation. These analyses were limited to administrative claims that lack indicators of depression disease severity.

KEYWORDS: Depression treatment guidelines, Antidepressants, NCQA, HEDIS, Health care expenditures

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The management of depression and associated costs of care continue to be topics for policy and health plan leaders.[1] Well-established depression treatment guidelines have been created, yet inadequate use of antidepressants continues.[2-5] This study examines factors associated with adherence to national treatment guidelines, including investigations of the impact of antidepressant and initial dosage level on adherence measures and costs.

An estimated 16% of the costs of antidepressant treatment were found to be associated with patients who were never adequately treated.[4] Inadequate dose and duration of antidepressant treatment has been reported to directly hinder treatment outcomes.[6] Nevertheless, in samples of privately insured patients, rates of inadequate antidepressant care have ranged from 35% to 51%.[4,7,8] Across studies, patients treated in primary care reported the lowest rates of adequate care,[4] whereas patients seen by both primary care physicians and psychiatrists[8] had higher rates than patients only seen in primary care.[7] Shasha et al. (1997) found that psychiatrists were more likely to prescribe antidepressants at an adequate dosage level, but nonpsychiatric physicians were more likely to attain adequate duration of treatment.[8]

Continuation of treatment during the acute and maintenance phases of therapy is encouraged by treatment guidelines regarding the adequate care of patients with depression. The National

Note: *An editorial on the subject of this article appears on pages 78-80 of this issue.*

Authors

REBECCA L. ROBINSON, MS, and STEPHEN ABLE, PhD, are health outcomes research consultants; ROBERT L. OBENCHAIN, PhD, is a research advisor; and RALPH W. SWINDLE, PhD, is a senior research scientist, all at U.S. Medical Division, Outcomes Research, Eli Lilly and Company, Indianapolis, Indiana; Obenchain is also with the U.S. Commercial Information Sciences division at Lilly. STACEY R. LONG, MS, is director, Outcomes Research and Econometrics; STELLA CHANG, MPH, is a senior manager; and ONUR BASER, PhD, is an economist, all at Medstat Research and Pharmaceutical Division, headquartered in Ann Arbor, Michigan.

AUTHOR CORRESPONDENCE: Rebecca L. Robinson, MS, Health Outcomes Research Consultant, U.S. Medical Division, Outcomes Research, Eli Lilly and Company, Lilly Corporate Center, Indianapolis, IN 46285. Tel: (317) 433-1323; Fax: (317) 277-7444; E-mail: rlrobinson@lilly.com

TABLE 1 NCQA HEDIS AMM Effectiveness of Care Measures—Commercial* Plan Performance

	2001*	2002*	2003*	2004*	Present Study†
Acute-phase treatment: the percentage of eligible members who remained on antidepressant medication continuously for 3 months after the initial diagnosis	56.9	59.8	60.7	60.9	64.8
Continuation-phase treatment: the percentage of eligible members who remained on antidepressant medication continuously for 6 months after the initial diagnosis	40.1	42.8	44.1	44.3	44.3
Practitioner contacts: the percentage of eligible members who received at least 3 follow-up practitioner contacts‡ in the 12-week acute-treatment phase after a new diagnosis of depression and prescription of antidepressant	19.8	19.2	20.3	20.0	39.0

** Commercial plans are nongovernment managed care plans. Data abstracted from the National Committee for Quality Assurance (NCQA) Health Plan Employer Data and Information Set (HEDIS). The state of health care quality 2005. Industry trends and analysis. Washington, DC: National Committee for Quality Assurance; 2005.[9] Available at: http://www.ncqa.org/Docs/SOHCQ_2005.pdf. Accessed November 10, 2005.*

† Commercially insured patients (n=60,386) in the Medstat MarketScan database who met the inclusion/exclusion criteria for claims from January 1, 2001, through September 30, 2004; patients were also excluded if they were missing data on the dose or quantity of the index medication or were initiated on multiple antidepressants as the initial therapy (exclusion criteria not in the AMM Technical Specifications) (see Table 2).

‡ The HEDIS measure for practitioner contacts changed in 2004 to include telephone interventions (CPT 99371-99373) as one of the visits if a depression diagnosis (ICD-9-CM 296.2x, 296.3x, 298.0x, 300.4x, 309.1x, 311.xx or DRG=426 for hospital inpatient claims) is on the medical claim. For optimal practitioner contacts for medical management, the HEDIS Technical Specifications include the requirement that "at least one of the three follow-up contacts must be with a prescribing practitioner (e.g., licensed physician, physician assistant or other practitioner with prescribing privileges)." The prescribing practitioner may not necessarily be the prescriber of the antidepressant for the patient.

AMM=Antidepressant Medication Management; CPT=current procedural terminology; DRG=diagnosis-related group; ICD-9-CM=International Classification of Diseases, Ninth Revision, Clinical Modification. NCQA=National Committee for Quality Assurance.

Committee for Quality Assurance (NCQA) standardized performance measures are based on the most commonly used guidelines, originally set forth by the Agency for Health Research and Quality (AHRQ).[9,10] NCQA performance measures are voluntarily reported by health plans, from the Health Plan Employer Data and Information Set (HEDIS), and are published annually by NCQA in an effort to improve quality of care and to assist decision makers in selecting quality health care plans.

Performance among HEDIS mental health domains lags significantly below that for non-mental health domains.[11] Reported rates of improvement for antidepressant medication management (AMM) have shown little improvement between 2001 and 2004 (see Table 1 for definitions of AMM measures).[9]

Mental health specialty care has been reported to be an important predictor of adequate treatment.[7,8,12,13] Less is known about the impact of drug-related factors independent of provider type on quality of care in the treatment of depression. With the wide variety of antidepressants available, this study sought to evaluate the independent association of the type of initiating drug dose level on adherence to the 3 individual HEDIS AMM measures and on overall adherence among depressed patients after adjusting for other clinical and demographic factors. We also examined the association of overall guideline adherence, initiating antidepressant, and initiating dosage levels on 6-month health care costs.

Methods

Data Source

This retrospective claims analysis utilized data from the MarketScan Commercial Claims and Encounter database for the period of January 1, 2001, through September 30, 2004. These data included health insurance claims across the continuum of care (e.g. inpatient, outpatient, outpatient pharmacy, carve-out behavioral health care) as well as enrollment data from large employers from across the United States who funded private health care coverage for more than 4 million employees and their dependents. This administrative claims database includes a variety of fee-for-service, preferred provider organization (PPO), and capitated health plans.

Study Population

Patients (employees and dependents) were included in this study if they met 2004 NCQA's HEDIS Technical Specifications, volume 2, for the AMM measures.[14] (See Table 2 for application of HEDIS Technical Specifications for sample determination.) All patients were required to be aged 18 years or older, newly diagnosed with depression (*International Classification of Diseases, Ninth Revision, Clinical Modification* [ICD-9-CM] = 296.2x, 296.3x, 298.0x, 300.4x, 309.1x, 311.xx or diagnosis-related group [DRG] = 426 for hospital inpatient claims), and have started antidepressant drug treatment within 30 days prior to or 14 days following the diagnosis. In addition, patients must have at least 120 days of continuous enrollment prior to initial diagnosis and 245 days of continuous enrollment following initial diagnosis. Patients who had a depression diagnosis on any claim during the 120 days prior to the first qualifying diagnosis date or drug treatment during the 90 days prior to the first qualifying drug date were excluded (Table 2).

Because this study examined the effect of dosage on AMM

TABLE 2 Patient Selection and Exclusion Criteria for Present Study

Criteria	No. of Patients Lost (%)	No. of Patients Remaining (%)
Depression diagnosis: • ≥1 principal or primary diagnosis of major depression (ICD-9-CM = 296.2, 296.3, 298.0, 300.4, 309.1, 311 or DRG = 426, excluding principal diagnosis of 301.12) in any setting (e.g., outpatient, inpatient, emergency services, or partial hospitalizations) *or* • >1 secondary diagnosis of major depression on different dates of service in any outpatient setting *or* • >1 secondary diagnosis of major depression on any inpatient discharge		562,898*
Exclude patients with diagnosis history: • determine patients' earliest qualifying encounter (index diagnosis date) *and* • exclude patients with prior depressive episodes (ICD-9-CM = 296.2-296.9, 298.0, 300.4, 309.0, 309.1, 309.28, 311 or DRG = 426, excluding principal diagnosis of 301.12) in the previous 120 days	39,991 (7.1)	522,907 (92.9)
Require continuous enrollment for 120 days prior to and 245 days following index diagnosis	240,000 (42.6)	282,907 (50.3)
Require antidepressant drug therapy beginning 30 days prior to and 14 days following index diagnosis	144,602 (25.7)	138,305 (24.5)
Exclude patients with antidepressant drug history: • identify the earliest qualifying prescription (30 days prior to or 14 days on or following index diagnosis) and • exclude patients with antidepressant pharmacy claims during the 90 days prior to the qualifying prescription date	41,608 (7.4)	96,697 (17.2)
Exclude patients with an acute mental health or substance abuse inpatient stay during the 245 days following index diagnosis (DRG = 424-432, except discharges with principal ICD-9-CM diagnosis of 317-319; or ICD-9-CM principal diagnosis of 290, 293-302, 306-316, or DRG = 433-437; or ICD-9-CM principal diagnosis of 291-292, 303-305, 960-979 with a secondary diagnosis of chemical dependency)	25,842 (4.6)	70,855 (12.6)
Additional exclusion not in the AMM Technical Specifications: Exclude patients with an invalid index drug claim (unknown dosage, unknown quantity, adjustment claim [adjudicated claims that were later found to be erroneous], or multiple antidepressant starts)	10,469 (1.9)	60,386 (10.7)†

** 4.9% of the 11,488,791 health plan members in the available dataset as of September 30, 2004.*
† 0.5% of the 11,488,971 health plan members in the available dataset as of September 30, 2004.
DRG = diagnosis-related group; ICD-9-CM = International Classification of Diseases, Ninth Revision, Clinical Modification.

compliance, patients whose index drug claim had missing or invalid dosage or quantity and patients who started on multiple antidepressant treatments were excluded from the study (1.9% of available patients, but 14.8% of otherwise-eligible patients, Table 2). Patients who switched or added drug therapies at a later time remained in the study. Patients who had an acute mental health or substance abuse hospital stay during the 245 days following the index diagnosis date were excluded.

Study Measures

To assess factors associated with adherence to 2004 NCQA HEDIS AMM measures, 4 dichotomous variables were created (where achievement = yes, failure to achieve = no). Three measures followed the individual components of the NCQA HEDIS AMM Technical Specifications criteria.[14] A fourth variable was created to capture an aggregate measure of overall adherence.

1. Optimal practitioner contacts. At least 3 billable claims for contacts with a primary care or mental health practitioner had to be coded with a mental health diagnosis during the 84 days following the new diagnosis of major depression. Consistent with HEDIS specifications, one of these visits may be for billable telephone interventions (current procedural terminology [CPT] 99371-99373) as long as a depression diagnosis was on that claim. The HEDIS Technical Specifications include the requirement that "at least one of the three follow-up contacts must be with a prescribing practitioner (e.g., licensed physician, physician assistant or other practitioner with prescribing privileges)." The prescribing practitioner may not necessarily be the prescriber of the antidepressant for the patient.

2. Effective acute-phase treatment. Pharmacy claims had to include at least 84 days supply of antidepressants during the first 114 days following initiation of the index medication.

3. Effective continuation-phase treatment. Pharmacy claims had to include at least 180 days supply of any antidepressants in the 214 days following initiation of the index medication.

4. Overall adherence. All 3 of the above performance measures had to be met.

To measure the influence of AMM adherence on costs, overall health care expenditures and depression-related expenditures during the 6-month postperiod were calculated. Total health care expenditures included the health plan paid amounts for insurance-reimbursable health care services, stratified by inpatient admissions, emergency department services, outpatient services, outpatient prescription drugs, and overall totals incurred during the 6 months following initiation of antidepressant therapy. The mean absolute days between the index

TABLE 3 Dosage Range of Antidepressants*

Drug	Low-Dose Range (mg)	Target-Dose Range (mg)	High-Dose Range (mg)
SSRI:			
Citalopram	<20	20-40	>40
Escitalopram		10	
Fluoxetine	<20	20-40	>40
Paroxetine	<20	20-40	>40
Sertraline	<50	50-150	>150
Fluvoxamine maleate	<50	50-100	>100
SNRI:			
Venlafaxine IR or XR	37.5-74	75-150	151+
Bupropion:			
Bupropion hydrochloride (Wellbutrin SR)	<150	150-300	>300
Bupropion hydrochloride (tablet)	<200	200-300	>300
Other:			
Mirtazapine	<15	15-30	>30
Nefazodone hydrochloride	<200	300-400	>400
Isocarboxazid	<20	20-40	>40
Maprotiline hydrochloride	<75	75-150	>150
Phenelzine sulfate	<45	45-60	>60
Tranylcypromine sulfate	<30	30	>30
Trazodone hydrochloride	<150	150-400	>400
TCA:			
Amitriptyline hydrochloride	<75	75-150	>150
Clomipramine hydrochloride	<25	25-150	>150
Desipramine hydrochloride	<100	100-200	>200
Doxepin hydrochloride	<75	75-150	>150
Imipramine hydrochloride	<50	50-100	>100
Imipramine pamoate	<50	50-100	>100
Nortriptyline hydrochloride	<25	25-100	>100
Protriptyline hydrochloride	<45	45-100	>100
Trimipramine maleate	<75	75-150	>150

**Adapted from Physicians' Desk Reference [online]. Available at: www.thomsonhc.com/hcs/librarian. Accessed July 17, 2005.*
IR=immediate release; XR=extended release; SNRI=serotonin norepinephrine reuptake inhibitor; SR=sustained release; SSRI=selective serotonin reuptake inhibitor; TCA=tricyclic antidepressant.

diagnosis and filled prescription was 7 days (median = 4 days). The subset of overall expenditures that were depression-related also was assessed.

Encounter records for patients in some plans are based on capitated payment records, and the payment field is rarely populated. To address this issue, a payment rate was assigned to each procedure code based on a regionally adjusted mean payment amount for that procedure from all Marketscan fee-for-service claims occurring in that year. All actual and proxy payments were then adjusted to 2004 dollars using the Consumer Price Index for all Urban Consumers (CPI-U).[15]

Measures of index antidepressant class, dosage level, patient characteristics, and clinical characteristics were used as independent variables.

Index medication. Patients initiated on any of the following agents were classified into 5 comparison groups based on the index antidepressant claim:

- TCAs (tricyclic antidepressants);
- SSRIs (selective serotonin reuptake inhibitors; fluoxetine, fluvoxamine, sertraline, paroxetine, citalopram, escitalopram);
- SNRIs (serotonin norepinephrine reuptake inhibitors; venlafaxine IR, venlafaxine XR), bupropion; or
- "Other antidepressant" (i.e., mirtazapine, nefazadone, trazodone, isocarboxazid, maprotiline, phenelzine sulfate, and tranylcypromine sulfate).

Medication use in this analysis was based on intent to treat. That is, if a patient initiated on an SSRI and switched or augmented using another drug class, their adherence rate and costs would be associated with the patient's initiation on SSRIs. No minimum duration period on the initiating drug was required in order to avoid biasing the sample toward adherent patients. Overall, 12.6% of patients switched or augmented sometime during the 6-month follow-up.

Index dosage level. Daily dose was calculated for the index medication based on the number of pills, strength, and days supplied. Daily doses were then defined as low, target, or high based on the dosage ranges specified in the product insert (PI) for each drug (see Table 3). For example, "target dose" was defined as 20-40 mg per day for fluoxetine and 75-150 mg per day for venlafaxine.

Patient characteristics. Patient characteristics were based on data available at the time of the index medication claim, including age, gender, geographic region (Northeast, North Central, South, or West), insurance plan type (capitated vs. noncapitated), and a proxy for household socioeconomic status (salary vs. hourly pay). Insurance plan types defined as capitated included health maintenance organizations and point of service (POS) with capitation. Noncapitated health plans included PPOs, basic/major medical, comprehensive, and noncapitated POS.

Clinical characteristics. Comorbid anxiety and bipolar disorders were measured in the preperiods and postperiods using individual ICD-9 codes (300.0x for anxiety disorder and 296.4x, 296.5x, 296.6x, 296.8x for bipolar disorder). Chronic disease was assessed by using inpatient and outpatient diagnoses to calculate the Charlson Comorbidity Index Score (CCI).[16] An indicator variable identifying patients receiving any mental health specialty care (any billed contact/encounter coded with a psychiatrist, mental health and chemical dependency treatment facility, psychologist, or psychiatric nurse) during the study period was also included.

Statistical Analysis

Univariate analyses, including *t* tests and chi-square tests, were used to analyze patient and clinical characteristics by initiating treatment groups. Multivariate regression models were used to evaluate differences across outcomes of interest: adherence to HEDIS guidelines and economic impact of adherence to HEDIS

TABLE 4 Demographic Characteristics, by Initiated Antidepressant Class

	All Initiators (N = 60,386)	SSRI (N = 41,971)	TCA (N = 2,226)	Venlafaxine (N = 5,222)	Bupropion (N = 6,644)	Other* (N = 4,323)
All patients, %	100.0	69.5	3.7	8.7	11.0	7.2
Female, %	68.7	69.8	70.8	68.5	64.5	63.6‡
Age, mean [SD]	42.8 [11.9]	42.4 [12.0]	46.9 [10.6]‡	43.3 [11.5]‡	42.3 [11.4]	45.5 [10.9] ‡
Capitated insurance, %	35.9	37.4	36.1	28.7‡	34.8	31.6
Salaried household, %	25.8	25.7	21.6‡	27.4†	28.7	25.5
Geographic region, %			‡	‡	‡	‡
Northeast	14.7	14.7	16.3†	13.0‡	14.7	15.4
North Central	26.6	26.7	23.2‡	27.9	26.0	26.7
South	33.1	31.4	36.9‡	40.6‡	33.9‡	37.7‡
West	25.4	26.9	23.5‡	18.4‡	25.2†	20.2‡
CCI score, mean [SD]	0.4 [1.1]	0.4 [1.1]	0.6 [1.3]‡	0.4 [1.1]	0.4 [0.9] ‡	0.6 [1.3]‡
Comorbid anxiety, %	9.6	10.0	9.6	8.9†	7.2‡	9.7
Comorbid bipolar, %	1.3	1.2	1.3	1.7†	1.5†	2.2‡
Any MH specialty care§, %	13.8	13.0	16.8‡	15.0‡	43.0‡	54.8‡
Initiating dose level, %			‡	‡	‡	‡
Low	24.9	24.8	55.9‡	11.2‡	11.6‡	46.6‡
Target	70.0	71.8	36.7‡	77.3‡	81.5‡	43.5‡
High	5.2	3.5	7.4‡	11.5‡	7.0‡	9.9‡
NCQA HEDIS AMM, % adherent	19.1	18.5	21.4‡	21.4‡	17.4†	23.1‡
Practitioner contacts	39.0	37.7	42.0‡	38.9	38.8	50.5‡
Acute-phase treatment	64.8	65.8	61.9‡	69.4‡	58.6‡	60.9‡
Continuation-phase treatment	44.3	44.5	47.1†	50.5‡	37.5‡	43.9

** "Other" includes mirtazapine, nefazadone, trazodone, isocarboxazid, maprotiline, phenelzine, and tranylcypromine.*
† P <0.05 compared with SSRI, using chi-square for categorical variables, and t test for continuous variables.
‡ P <0.001 compared with SSRI, using chi-square for categorical variables, and t test for continuous variables.
§ MH specialty care = one or more contacts with psychiatrist, mental health and chemical dependency treatment facility, psychologist, or psychiatric nurse.
AMM = Antidepressant Medication Management; CCI = Charlson Comorbidity Index; NCQA = National Committee for Quality Assurance; SSRI = selective serotonin reuptake inhibitor; TCA = tricyclic antidepressant.

guidelines. Covariates in these analyses were selected a priori and included all patient and clinical characteristics listed above and described in Table 4.

Logistic regression models were used to assess the impact of the index medication and dosage level (low, target, high) with adherence to AMM for appropriate treatment in patients with depression. A series of expenditure models were estimated to evaluate the incremental economic impact of adherence to the 3 HEDIS measures and the overall adherence measure, controlling for other observable variables of index medication, dosage level, patient demographics, and clinical characteristics.

After reviewing the distribution of the dependent expenditure variables, it was determined that exponential conditional mean (ECM) models were most appropriate.[17] These models produced parameter estimates for each covariate, which were used to compute the marginal effects (MEs) of these characteristics on health care expenditures. To ensure that 2 or more variables were not measuring the same construct, variance inflation factors were examined to assess potential multicollinearity, and no interaction terms were deemed necessary. *T* tests and chi-square tests were conducted using SAS version 8.0 (Cary, NC), and multivariate analyses were conducted using STATA 8.0 (College Station, TX) software.

Results

Descriptive Statistics

Table 4 provides baseline characteristics for the overall study population stratified by the index therapy. The mean age in the overall study population was 43 years, and 69% of subjects were female. Most of the 60,386 individuals in the study initiated therapy on SSRIs (69.5%), followed by bupropion (11.0%), SNRIs (venlafaxine, 8.7%), and TCAs (3.7%). Seven percent of

TABLE 5 *Unadjusted Expenditures and Incidence by NCQA HEDIS AMM Adherence Status in the 6 Months Following Initiation of Antidepressant Treatment (Adherent on All 3 Measures Versus Not Adherent)*

	Not Adherent (n = 8,860)	Adherent (n = 11,526)	*P* Value
Mean age (SD)	42.5 (12.0)	44.2 (11.1)	<0.001
Female %	69.0	67.3	<0.001
Mean CCI score (SD)	0.4 (1.1)	0.5 (1.1)	<0.001
Any MH specialty care*, %	33.9	68.0	<0.001
% SSRI	70.0	67.5	<0.001
% at target initiating dose	70.4	68.4	<0.001

	6-Month Mean Expenditure Incidence (%)	Median	SD	6-Month Mean Expenditure Incidence (%)	Median	SD	*P* Value
All Diagnoses							
Inpatient admissions	$1,503 4,266 (8.7)	$0	$12,125	$1,349 901 (7.8)	$0	$10,989	<0.001 0.002
ER visits	$167 11,518 (23.6)	$0	$715	$183 2,813 (24.4)	$0	$824	0.736 0.059
Outpatient services	$3,059 48,797 (99.9)	$1,242	$7,299	$4,389 11,525 (100.0)	$2,555	$6,933	<0.001 <0.001
Psychiatrist visits	$89 16,572 (33.9)	$0	$467	$371 7,840 (68.0)	$350	$967	<0.001 <0.001
Outpatient pharmacy	$1,600 48,513 (99.3)	$936	$2,531	$2,820 11,489 (99.7)	$1,947	$2,962	<0.001 <0.001
Total	$6,329	$2,734	$16,891	$8,741	$5,169	$15,586	<0.001
Depression-Related (Primary or Secondary Diagnosis)							
Inpatient admissions	$51 522 (1.1)	$0	$929	$51 101 (0.9)	$0	$1,013	0.097 0.066
ER visits	$9 993 (2.0)	$0	$104	$11 257 (2.2)	$0	$143	0.513 0.1811
Outpatient services	$367 47,523 (97.3)	$130	$975	$1,130 11,455 (99.4)	$658	$1,617	<0.001 <0.001
Psychiatrist visits	$60 3,740 (7.7)	$0	$339	$278 2,485 (21.6)	$222	$794	<0.001 <0.001
Mental health pharmacy	$587 47,581 (97.4)	$415	$661	$1,350 11,487 (99.7)	$1,021	$1,165	<0.001 <0.001
Total (depression- related)	$1,014	$677	$1,585	$2,541	$1,922	$2,475	<0.001

** MH specialty care = one or more contacts with psychiatrist, mental health and chemical dependency treatment facility, psychologist, or psychiatric nurse.*
AMM = Antidepressant Medication Management; CCI = Charlson Comorbidity Index; ER = emergency room; HEDIS = Health Plan Employer Data and Information Set; NCQA = National Committee for Quality Assurance; SSRI = selective serotonin reuptake inhibitor.

individuals were initiated on "other antidepressants." The largest proportion of patients who received "other antidepressants" was 3.3% for trazodone, 1.9% for mirtazapine, 1.9%% for nefazadone, and <0.1% for the remaining monoamine oxidase inhibitors and maprotiline. Aside from initiating dose levels and proportion of patients with mental health specialty care, differences in patient clinical and demographic characteristics across the comparator drug groups were minimal, although several differences between the SSRI cohort and other classes of antidepressant users were considered statistically significant. Overall, approximately 70% of patients initiated antidepressant drug therapy at target (recommended) dose ranges. The proportion of TCA (37%) and other antidepressant users (44%) initiating at target-dose ranges was significantly lower, while the proportion of bupropion (82%) and venlafaxine (SNRI, 77%) users initiating at target levels was significantly higher than SSRI users (72%)

TABLE 6 Factors Associated With Adherence to NCQA HEDIS AMM Measures: Results of Logistic Regression Analysis

	Outcomes											
	Optimal Practitioner Contacts			Guideline-Adherent Acute Treatment			Guideline-Adherent Continuation Treatment			Overall Adherence		
	Odds Ratio	LL 95% CI	UL 95% CI	Odds Ratio	LL 95% CI	UL 95% CI	Odds Ratio	LL 95% CI	UL 95% CI	Odds Ratio	LL 95% CI	UL 95% CI
TCA*	0.991	0.900	1.092	0.766¶	0.699	0.839	0.973	0.890	1.064	0.973	0.871	1.087
SNRI (venlafaxine)*	1.027	0.961	1.097	1.138¶	1.068	1.213	1.191¶	1.121	1.264	1.134¶	1.052	1.222
Bupropion*	1.000	0.943	1.061	0.700¶	0.663	0.739	0.702¶	0.665	0.742	0.866¶	0.806	0.930
Other AD*	1.348¶	1.256	1.447	0.741¶	0.693	0.792	0.859¶	0.804	0.918	1.032	0.953	1.119
Northeast†	1.424¶	1.340	1.513	1.045	0.985	1.108	1.184¶	1.120	1.251	1.383¶	1.292	1.481
North Central†	1.152¶	1.081	1.228	0.985	0.928	1.046	1.101¶	1.039	1.166	1.177¶	1.091	1.269
South†	1.000	0.946	1.057	0.834¶	0.793	0.877	0.936‖	0.890	0.983	0.97	0.907	1.036
Unknown region†	0.763	0.500	1.166	0.506¶	0.344	0.745	0.519‖	0.338	0.797	0.494‖	0.273	0.895
Age	0.990¶	0.989	0.992	1.024¶	1.023	1.026	1.032¶	1.030	1.033	1.012¶	1.010	1.014
Female	0.896¶	0.862	0.932	1.129¶	1.088	1.171	1.142¶	1.102	1.184	1.026	0.980	1.074
Salaried-wage household	0.965	0.916	1.017	1.544¶	1.471	1.621	1.581¶	1.507	1.658	1.349¶	1.267	1.436
Unknown-wage-type household	0.976	0.928	1.027	1.269¶	1.212	1.329	1.332¶	1.272	1.395	1.284¶	1.207	1.366
CCI>0	1.023‖	1.006	1.040	0.971¶	0.955	0.986	0.973¶	0.958	0.988	1.006	0.987	1.026
Comorbid anxiety	2.119¶	2.010	2.233	1.017	0.967	1.070	1.086¶	1.034	1.140	1.65¶	1.558	1.748
Comorbid bipolar	3.083¶	2.583	3.680	1.023	0.879	1.191	1.097	0.949	1.267	1.553¶	1.334	1.809
Capitated insurance	0.813¶	0.778	0.849	1.082¶	1.039	1.126	1.024	0.985	1.066	0.916¶	0.871	0.965
Any MH specialty care§	5.832¶	5.617	6.055	1.382¶	1.333	1.433	1.459¶	1.409	1.510	3.895¶	3.724	4.074
Low-dose initiator‡	1.099¶	1.051	1.148	0.861¶	0.827	0.897	0.845¶	0.811	0.879	0.963	0.914	1.015
High-dose initiator‡	0.966	0.891	1.048	1.317¶	1.210	1.434	1.583¶	1.466	1.711	1.259¶	1.156	1.372

** Relative to SSRI.*
† Relative to West.
‡ Relative to recommended (target) dose initiators.
§ Any MH specialty care = one or more contacts with psychiatrist, mental health and chemical dependency treatment facility, psychologist, or psychiatric nurse
‖ P<0.05.
¶ P<0.001.
AD = antidepressant; AMM = Antidepressant Medication Management; CCI = Charlson Comorbidity Index; CI = confidence interval; HEDIS = Health Plan Employer Data and Information Set; LL = lower limit; MH = mental health; NCQA = National Committee for Quality Assurance; SNRI = serotonin norepinephrine reuptake inhibitor; SSRI = selective serotonin reuptake inhibitor; TCA = tricyclic antidepressant; UL = upper limit.

(all P <0.001). Overall, 32% of patients titrated at some point during the 6-month follow-up (data not shown).

Across the entire study population, 19% of patients met all 3 HEDIS AMM measures, 39.0% met the criteria for the optimal practitioner contacts measure (the proportion of telephone contacts was not measured), 64.8% met criteria for acute-phase treatment, and 44.3% were adherent for the continuation-phase treatment measure (Table 4).

Unadjusted 6-month, postindex direct health care expenditures stratified by the overall adherent cohort versus nonadherent cohort are presented in Table 5. Individuals adherent with all 3 HEDIS AMM measures had median total costs that were nearly 2 times higher ($5,169 vs. $2,734), and approximately 37% of the total costs were for depression-related care in the adherent group ($1,922) versus 25% ($677 of $2,734) in the nonadherent group. On average, adherent individuals had depression-related outpatient service costs that were more than double those in patients who were nonadherent. Depression-related outpatient pharmaceutical costs also were 2 times higher for adherent individuals.

Multivariate Modeling Results

Table 6 (logistic regression models) and Table 7 (exponential conditional mean regression models) report the results of the multivariate analyses, controlling for all potential patient and clinical confounding factors as specified in Table 4. Receipt of mental health specialty care was the only consistently significant association and was the largest single contributor in each model. Individuals with at least 1 encounter with a psychiatrist, psychologist, mental health treatment facility, or psychiatric nurse were 5 times more likely to meet optimal practitioner contacts (OR = 5.832; 95% CI, 5.62-6.06), 3 times more likely to meet overall adherence (OR = 3.895; 95% CI, 3.73-4.07), and approximately 1.4 times more likely to complete acute- (OR = 1.382; 95% CI, 1.33-1.43) and continuation-phase treatment (OR = 1.459; 95% CI, 1.41-1.51).

Results varied according to initiating antidepressant therapy and individual adherence measures. Patients initiating on venlafaxine (SNRI) were more likely than SSRI initiators to meet the HEDIS adherence measures for acute- (OR = 1.138; 95% CI, 1.07-1.21) and continuation-phase treatment (OR = 1.191; 95%

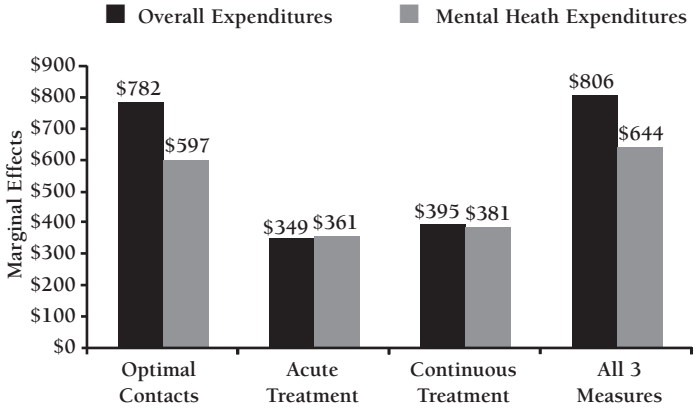
TABLE 7 Impact of Adherence to NCQA HEDIS AMM Measures on 6-Month Overall and Depression-Related Expenditures: Results From Exponential Conditional Mean Regression Models (Marginal Effects*)

	Outcomes			
	Marginal Effect on Overall Costs (*P* Value)		Marginal Effect on Depression-Related Costs (*P* Value)	
Overall adherence	$806	(0.001)	$644	(0.001)
TCA†	$964	(0.001)	-$18	(0.527)
SNRI (venlafaxine)†	$402	(0.001)	$133	(0.001)
Bupropion†	$131	(0.142)	$79	(0.001)
Other AD†	$654	(0.001)	$99	(0.001)
Northeast‡	$661	(0.001)	$198	(0.001)
North Central‡	$752	(0.001)	$149	(0.001)
South‡	$930	(0.001)	$179	(0.001)
Unknown region‡	-$631	(0.221)	-$142	(0.008)
Age	$42	(0.001)	$2	(0.001)
Female	$233	(0.001)	-$15	(0.207)
Salaried-wage household	$144	(0.080)	$48	(0.003)
Unknown-wage-type household	-$62	(0.400)	-$42	(0.001)
CCI>0	$1,244	(0.001)	$42	(0.001)
Comorbid anxiety	$334	(0.001)	$25	(0.045)
Comorbid bipolar	$1,867	(0.001)	$432	(0.001)
Capitated insurance	-$670	(0.001)	-$139	(0.001)
Any MH specialty care‖	$494	(0.001)	$335	(0.001)
Low-dose initiator§	-$227	(0.001)	-$99	(0.001)
High-dose initiator§	$1,195	(0.001)	$360	(0.001)

** Marginal effect of a 1-unit change and corresponding P values (in brackets) are reported.*
† Relative to SSRI.
‡ Relative to West.
§ Relative to recommended (target) dose initiators.
‖ Any MH specialty care = one or more contacts with psychiatrist, mental health and chemical dependency treatment facility, psychologist, or psychiatric nurse.

AD = antidepressant; AMM = antidepressant medication management; CCI = Charlson Comorbidity Index; HEDIS = Health Plan Employer Data and Information Set; MH = mental health; NCQA = National Committee for Quality Assurance; SNRI = serotonin norepinephrine reuptake inhibitor; SSRI = selective serotonin reuptake inhibitor; TCA = tricyclic antidepressant.

FIGURE 1 Regression-Adjusted Marginal Effects of NCQA HEDIS Measures of Adherence* on Overall and Mental Health Expenditures for 6 Months Postindex Drug



** For optimal contacts, the HEDIS Technical Specifications include the requirement that "at least one of the three follow-up contacts must be with a prescribing practitioner (e.g., licensed physician, physician assistant or other practitioner with prescribing privileges)." The prescribing practitioner may not necessarily be the prescriber of the antidepressant for the patient.*
HEDIS = Health Plan Employer Data and Information Set; NCQA = National Committee for Quality Assurance.

CI, 1.12-1.26) as well as achieving combined overall adherence (OR = 1.134; 95% CI, 1.05-1.22). Bupropion initiators were less likely to meet the criteria on these same measures relative to SSRIs (effective acute treatment [OR = 0.700; 95% CI, 0.66-0.74]; continuation-phase treatment [OR = 0.702; 95% CI, 0.67-0.74]; and overall guideline adherence [OR = 0.866; 95% CI, 0.81-0.93]). Venlafaxine and bupropion users did not differ from SSRI users with respect to likelihood of meeting criteria for the optimal practitioner contacts measures after controlling for confounding factors.

Other antidepressant initiators were more likely to achieve optimal contacts (OR = 1.348; 95% CI, 1.26-1.45) than SSRI initiators but were less likely to receive effective treatment in both the acute and continuation phases (OR = 0.741; 95% CI, 0.69-0.79 and OR = 0.859; 95% CI, 0.80-0.92). Other antidepressant users did not differ from SSRI users with respect to overall guideline adherence. TCA initiators were less likely than SSRI initiators to meet effective acute-phase treatment guidelines (OR = 0.766; 95% CI, 0.70-0.84) but did not differ from SSRI patients on all other measures.

Compared with patients initiating therapy at target doses, low-dose initiators were more likely to receive optimal practitioner contacts (OR = 1.099; 95% CI, 1.05-1.15) but less likely to meet effective acute- and continuation-phase treatment (OR = 0.861; 95% CI, 0.83-0.90 and OR = 0.845; 95% CI, 0.81-0.88, respectively). Low-dose initiators did not differ from target-dose initiators with respect to likelihood of overall guideline compliance. High-dose initiators, however, were more likely than target-dose initiators to meet effective acute- (OR = 1.317; 95% CI, 1.21-1.43) and continuation-phase treatment (OR = 1.583; 95% CI, 1.47-1.71) and overall adherence (OR = 1.259; 95% CI, 1.16-1.37) but did not differ on optimal practitioner contacts (OR = 0.966; 95% CI, 0.89-1.05).

Three additional factors were significantly associated with all adherence measures; however, the direction of the relationship for optimal contacts was the opposite to that of the acute- and continuation-phase treatment measures. Being male, younger, and having higher CCI scores were associated with receiving at least 3 practitioner contacts (all $P < 0.01$); however, these same factors were also associated with significantly less likelihood of adhering to acute- and continuation-phase treat-

ment guidelines (all P <001).

Mean predicted total 6-month health care cost from the ECM models was $3,067 overall, and the ME associated with AMM measure adherence on overall health care expenditures was an additional $806. Predicted depression-related costs were $743, and the ME of overall AMM compliance was $644. The MEs of other patient characteristics on overall and depression-related costs are presented in Table 7. Figure 1 presents the ME of HEDIS AMM adherence on estimated overall and depression-related regression-adjusted health care expenditures for patients for the individual NCQA components and the overall adherence measure.

Among the subset of subjects meeting overall AMM adherence, SSRI users had significantly lower expenditures during the 6-month follow-up observation period than users of TCAs, venlafaxine, bupropion, and other antidepressants (P <0.030, ME for TCA=$794, venlafaxine=$853, bupropion=$364, other antidepressant = $934; data not shown) after controlling for confounding patient, clinical, and drug-related factors. With regard to depression-related expenditures, fully adherent venlafaxine (ME=$291), bupropion (ME=$184) and other antidepressant initiators (ME = $416) had significantly higher depression-related expenditures in the 6-month observation period than did adherent SSRI initiators. Depression-related expenditures in the follow-up period did not significantly differ between SSRI and TCA users. Among fully guideline-adherent individuals, those initiating antidepressant drug therapy at higher than target doses had significantly higher expenditures ($1,036 overall, $546 depression-related, P <0.001) than persons who initiated at target doses, while expenditures for those initiating at lower-than-target doses were significantly lower (P <0.001) from target-dose initiators (ME=$-369; $-187 for overall and depression-related expenditures, respectively).

Discussion

Consistent with previous research,[7,11-13] we found that mental health specialty care was the largest contributor to performance on AMM adherence measures. Individuals with at least 1 encounter with a psychiatrist, psychologist, mental health treatment facility, or psychiatric nurse were 5 times more likely to meet the quality measure of optimal practitioner contacts and roughly 1.4 times more likely to be adherent to the acute- and continuation-phase treatment measures.

Even when mental health specialty and other factors were considered, the type of initiating antidepressant was still independently associated with the AMM adherence measures. SNRIs were the most strongly associated with adherence, and bupropion was the most strongly associated with nonadherence. These findings were consistent in 3 of the 4 adherence measures (effective acute treatment, effective continuation treatment, and overall adherence).

"Other antidepressant" initiators (e.g., mirtazapine, nefazadone, trazodone) relative to SSRI initiators was the only group associated with adherence to the optimal practitioner contacts. Differences across initiating antidepressants may be related to specific drug attributes. For example, some research suggests dual-acting agents, such as SNRIs and some TCAs, improve both the likelihood of quality treatment and outcomes.[18,19] Bupropion, an antidepressant of the aminoketone class, is chemically unrelated to other known antidepressant agents and is typically used in combination with other antidepressants. This usage may hinder its performance in guideline-adherent treatment measures. Further research is needed to clarify if these or other possibilities may explain our findings.

Two other studies reported results similar to the findings of the present study. Yu-Isenberg et al. (2004) found that patients receiving venlafaxine (adequate dose: 67.5-165 mg) were 3 times more likely than those receiving fluoxetine (adequate dose: 18-22 mg) to achieve dose-related "adequate" treatment during acute and continuous treatment phases in a large managed care organization claims database.[20] Yu-Isenberg et al. speculated that the higher remission rates with SNRIs (venlafaxine) than SSRIs in clinical trials may be reflected in their findings.[20]

Busch et al. (2004) found that the specific antidepressant initiated relative to a TCA had little impact on adherence to the guideline for continuation-phase treatment in the Department of Veterans Affairs (VA).[21] We, too, found no difference between TCA and SSRI initiators on effective continuation treatment, optimal number of practitioner contacts, or overall adherence measures. We did, however, find TCA initiators were less likely to achieve guideline-adherent acute-phase treatment.

Quality care in the VA as reported by Busch et al. was similar regardless of whether it was provided in a mental health clinic or other setting, whereas in the Martketscan data from January 1, 2001, to September 30, 2004, used in the present study, receipt of specialty mental health care was the largest contributing factor across all adherence measures. These differences may underscore the complexities associated with specific payer settings that are unmeasurable in retrospective administrative claims. This highlights an important limitation that these findings are not generalizable to other settings. Further work is necessary to determine if consistent patterns of associations with adherence outcomes are found in different payer settings or if quality differences are an artifact of the method of data collection.

Likewise, adherence rates in the 2001 VA data were higher, at 85% and 54% for effective acute-phase and continuation-phase treatment, in contrast to 65% and 44%, respectively, in the present study, and the ranges of 57% to 61% for acute care and 40% to 44% for continuation-phase care during the 2001-2004 reporting years for the NCQA Quality Compass reports of commercial populations.[9]

Rates of optimal practitioner contacts reported by NCQA are considerably lower (19.2% to 20.3%) than our finding of 39%. A possible explanation may be due to differences in study

population characteristics. The database used in the present study includes claimants that have their insurance coverage through large Fortune 500 companies. These employers may offer premium coverage at rates affordable to their recipients or may encourage disease management programs to enhance quality care. Cost constraints have been reported to impact antidepressant medication adherence and threaten quality care.[22] Lee and Zapert (2005) reported data from the Harris Interactive Strategic Health Perspectives Survey that found that patients enrolled in higher-deductible plans were less likely to fill antidepressant prescriptions because of costs than patients in the non-high-deductible group.[22] In a recent article from *The New York Times,* employers, who are especially concerned about depression impacting employee productivity, have influenced insurers to pay for programs to manage depression.[23]

Another reason adherence to optimal contacts may be higher in the present study is that we excluded patients with incomplete index drug claims (i.e., unknown dosage, quantity) or prescription fills for multiple antidepressants on a single day following the depression diagnosis. These patients represented 1.9% of all patients prior to application of the exclusion criteria and 14.8% of otherwise-eligible patients according to the other exclusion criteria; they may have been more likely to be missing visit data as well and therefore may have reduced our rate slightly if they had remained in the study.

Another finding from the present study was that low-dose initiators were more likely to receive an optimal number of practitioner contacts than patients initiated at target doses. However, low-dose initiators were less likely to meet guideline adherence on acute- and continuation-phase treatment, whereas high-dose initiators were more likely to adhere to these measures than those initiating therapy at target doses. These findings are consistent with those reported by Katzelnick et al. (1996), who found that patients initiating at inadequate doses were less likely to receive a second antidepressant prescription, regardless of provider specialty.[24] Both of these studies addressed populations of patients aged 65 years or younger. These findings may vary in study populations of older patients who may initiate anti-depressant therapies at lower doses and who may tend to have lower AMM quality scores (based on rates of adherence for Medicare patients).[9]

Not surprisingly, costs were higher for AMM-adherent individuals in the 6 months following initiation of treatment. This was consistent with previous research by Eaddy et al. (2005) that found that, among patients with depression and prescribed SSRIs, no medical cost offsets for higher pharmacy costs were found in patients who remained on their antidepressant for 90 days or longer,[25] although research reported 9 years earlier found that adherent patients incurred lower medical-only charges.[24]

The present study found that the major cost drivers were outpatient contacts and depression-related pharmaceuticals, factors that determine AMM compliance. The ME associated with AMM adherence on overall 6-month health care expenditures was $806, of which $644 was attributable to depression-related services and antidepressant therapies. As expected, those with capitated insurance and low-dose initiators (compared with target-dose initiators) had significantly lower expenditures. Controlling for other factors, including overall guideline adherence, SSRI users had significantly lower overall costs than all other antidepressants with the exception of bupropion users. Depression-related costs were significantly lower among SSRI users, with the exception of TCA users (data not shown).

Limitations

Several factors should be considered when interpreting these findings. Foremost among the considerations is the large size of the groups, which allows us to detect statistically significant results for relatively small absolute differences between groups in some comparisons.

Second, a significant limitation of this study is its reliance on administrative (insurance) claims and the absence of depression severity, which may directly impact both therapy decisions and adherence measures. The findings of this study are also subject to the usual limitations of administrative datasets.[26,27] For example, the treatment groups may be misclassified or there may be unobserved confounders that were not adequately controlled for in the multivariate analysis.

Third, rates of adherence to AMM quality measures may underreport actual quality of care since patients may receive treatment (e.g., advice or consult rendered by telephone) that is not submitted to their health plan for reimbursement and thus not included in the administrative claims data, or coding errors or omissions may have occurred. Kobak et al. (2002), in a separate study of those patients failing to meet one or more of the 3 AMM measures, found that the most common reason for visits failure (77% of overall failures) was that the patient restarted a previously prescribed successful antidepressant (16% of visits failure), including 12% of patients who had a visit with the prescribing provider, but mental health was not coded or documented in the case notes.[28] Overall, misclassification of contacts was the most common reason for failure to meet the optimal number of practitioner contacts. On the other hand, 25% of patients had told their physician that they were taking their medication when the pharmacy claims database showed that they were not.

Fourth, generalizability is limited to the time frame assessed and to privately insured patients who may differ from the uninsured or publicly funded patients. Since the time of these analyses, the U.S. marketplace has changed, including (a) the introduction of more generic antidepressants such as paroxetine and citalopram, (b) the introduction of new products such as duloxetine, (c) the partial withdrawal of nefazadone, and (4) U.S. Food and Drug Administration warnings regarding the possibility of suicidality and other safety considerations for the

use of all antidepressants.

Fifth, this study only addresses adherence to the 3 NCQA HEDIS AMM measures. We did not assess the HEDIS measure of follow-up after hospitalization for depression. We also cannot assert that these performance measures are directly related to treatment outcomes. For example, there is no assurance that a given guidelines-adherent patient will achieve clinical response or remission of depression. Those with persistent or treatment-resistant depression may be more likely to satisfy the requirements of current measures but may still not receive adequate care.

Sixth, the expenditure assessment only focuses on costs incurred during the 180 days following initiation of antidepressant therapy; therefore, some of the cost savings due to medication adherence may not be realized for several months or possibly years following treatment. Rost et al. (2005) found that it took 2 years to realize the cost offset of enhanced care provided through successful depression management.[1] This may be a period longer than a patient stays in a health plan.

Despite these significant limitations, this study appears to be the first to simultaneously address the impact of antidepressant class and dosage level on NCQA HEDIS AMM measures in a commercial setting. And while the study is limited by its reliance on administrative claims data, this is the same type of information that health plans are required to use when reporting NCQA AMM measures. Claims data do provide a naturalistic method for observing real-world treatment patterns that are unavailable in data collected in clinical trials.

These findings may reveal many implications for policy and health plan leaders. Although specialty care may improve rates of quality depression treatment, increasing the amount of treatment provided by psychiatrists may not be feasible because of the limited number of available psychiatrists and limitations on insurance benefits for such mental health interventions. Sherbourne et al. (2004) found that patients with depression in the United States were likely to receive treatment only from primary care providers and, half of the time, this was ineffective care.[28] Sherbourne et al. concluded that either marked changes in the delivery infrastructure, allowing greater availability of treatments or greater integration of primary care with mental health specialty practices to facilitate combined treatments, was necessary to improve quality of care.[29]

Thomas et al. (2002) found that quality care, as measured by response speed and rate of remission, was comparable in primary care and mental health specialty settings when an intervention was implemented to facilitate the use of AHRQ depression treatment guidelines.[30] These are the same guidelines that are the bases for the NCQA HEDIS performance measures. Thomas et al. designed their intervention based on the research findings that showed that when primary care physicians follow practice guidelines, their use can positively influence process of care and clinical outcomes of care.[31] Quality improvement strategies should consider targeting each performance measure separately since significant associations with therapy, patient, and clinical characteristics varied greatly between individual performance measures. Current evidence suggests that collaborative care models most strongly improve both the likelihood of quality treatment and outcome, especially in depressed patients who were prescribed adequate dosages of antidepressants.[32]

Conclusions

Adherence to NCQA guidelines for appropriate care for depression was highest for the measure of acute-phase treatment (65%), and lower for continuation-phase treatment (44%) and number of practitioner contacts (39%). These absolute rates are slightly higher than NCQA's reported rates for acute-phase and continuation-phase treatment and significantly higher for practitioner contacts. Contact with a mental health specialist was associated with higher adherence to NCQA guidelines. Type of antidepressant was associated with adherence to treatment guidelines—higher for venlafaxine and lower for bupropion compared with SSRIs—but the ORs were smaller than for the receipt of mental health specialty care, high initial dose of drug, and comorbid disorders (anxiety or bi-polar disease). Total pharmacy and medical costs and depression-related costs were higher for guideline-adherent individuals in the 6 months following treatment initiation with an antidepressant. Achieving guideline-adherent care appears to be related to initial treatment choices of drug, dosage level, and provider type, but it will likely increase the cost of care in the short term. These analyses were limited to administrative claims that lack indicators of depression disease severity, and the group sizes were very large.

DISCLOSURES

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