

# Use of Treatment Services in a Comparative Effectiveness Study of Bipolar Disorder

Louisa G. Sylvia, Ph.D.

Dan Iosifescu, M.D.

Edward S. Friedman, M.D.

Emily E. Bernstein, B.S.

Charles L. Bowden, M.D.

Terence A. Ketter, M.D.

Noreen A. Reilly-Harrington, Ph.D.

Andrew C. Leon, Ph.D.

Joseph R. Calabrese, M.D.

Michael J. Ostacher, M.D., M.P.H.

Dustin J. Rabideau, M.S.

Michael E. Thase, M.D.

Andrew A. Nierenberg, M.D.

**Objective:** Bipolar disorder is a severe, chronic mental illness with a high incidence of medical and psychological comorbidities that make treatment and prevention of future episodes challenging. This study investigated the use of services among outpatients with bipolar disorder to further understanding of how to maximize and optimize personalization and accessibility of services for this difficult-to-treat population.

**Methods:** The Lithium Treatment–Moderate Dose Use Study (LiTMUS) was a six-month multisite, comparative effectiveness trial that randomly assigned 283 individuals to receive lithium plus optimized care—defined as personalized, guideline-informed care—or optimized care without lithium. Relationships between treatment service utilization, captured by the Cornell Service Index, and demographic and illness characteristics were examined with generalized linear marginal models.

**Results:** Analyses with complete data (week 12, N=246; week 24, N=236) showed that increased service utilization was related to more severe bipolar disorder symptoms, physical side effects, and psychiatric and general medical comorbidities. Middle-aged individuals and those living in the United States longer tended to use more services than younger individuals or recent immigrants, respectively. **Conclusions:** These data suggest that not all individuals with bipolar disorder seek treatment services at the same rate. Instead, specific clinical or demographic features may affect the degree to which one seeks treatment, conveying clinical and public health implications and highlighting the need for specific approaches to correct such discrepancies. Future research is needed to elucidate potential moderators of service utilization in bipolar disorder to ensure that those most in need of additional services utilize them. (*Psychiatric Services* 64:1119–1126, 2013; doi: 10.1176/appi.ps.201200479)

Bipolar disorder is a severe, chronic, and disabling mental illness characterized by episodes of mania, hypomania, and depression (1). Patients with bipolar disorder often have multiple psychiatric and general medical comorbidities (2–6). Their risk of having at least one general medical comorbidity is increased threefold compared with persons without bipolar disorder (7), and chronic medical disorders are correlated with a more severe and earlier course of illness (7,8). Thus bipolar disorder often requires extensive, life-long care, making this illness one of the most difficult and expensive conditions to treat worldwide (9,10).

Persons with bipolar disorder who do not use counseling and medical services to help with the disorder's impairment tend to experience a worse course of illness (4,8). Reports of how these patients use services are inconsistent. For example, in some studies, individuals with bipolar disorder used more general medical, psychiatric, and total services compared with the general population (3,11), whereas other studies concluded that these individuals sought fewer general medical services than sought by the general population, resulting in comorbid conditions that went undiagnosed and untreated (12–15). The Lithium Treatment–Moderate Dose Use Study (LiTMUS) found that only 61% of participants with hypertension and 48% of participants with hyperlipidemia had received diagnoses of these conditions (5). Furthermore, much of this limited work

---

*Dr. Sylvia, Ms. Bernstein, Dr. Reilly-Harrington, and Dr. Nierenberg are with the Department of Psychiatry and Mr. Rabideau is with the Biostatistics Center, Massachusetts General Hospital, 55 Fruit Street, Boston, MA 02114 (e-mail: lsylvia2@partners.org). Dr. Iosifescu is with the Department of Psychiatry and Neuroscience at Mount Sinai Medical School, New York City. Dr. Friedman is with the Department of Psychiatry, University of Pittsburgh School of Medicine, Pittsburgh. Dr. Bowden is with the Department of Psychiatry, University of Texas Health Sciences Center, San Antonio. Dr. Ketter and Dr. Ostacher are with the Department of Psychiatry and Behavioral Sciences, Stanford University, Stanford, California. Dr. Leon, who passed away in 2012, was with the Department of Psychiatry, Weill Medical College of Cornell University, New York City. Dr. Calabrese is with the Department of Psychiatry, Case Western Reserve University, Cleveland, Ohio. Dr. Thase is with the Department of Psychiatry, University of Pennsylvania, Philadelphia.*

has been done with populations of military veterans; hence service utilization research with broader bipolar outpatient populations is much needed.

Studies have addressed specific factors that may affect service utilization. The following have been associated with increased service utilization: being middle-aged or Caucasian; having insurance; having a greater number of comorbid medical and psychiatric disorders; and having dyslipidemia, obesity, comorbid anxiety, more severe psychopathology, impaired functioning, and perceived need for help (6,7,15,16). People who are in a racial-ethnic minority group, single, and currently or recently homeless are less likely to seek services (15,17,18). Younger individuals and females are also more likely to report needing help but are less likely to seek services (15,17). In this study, we further investigated the prevalence and correlates of service utilization in bipolar disorder.

We expected that individuals who were older and Caucasian with greater severity of illness, symptoms, and side effects and lower functioning would use more services. We also expected that individuals with more psychiatric and general medical comorbidities would have a higher frequency of using all treatment services and that Caucasian, younger, college-educated, and single individuals would seek counseling services.

## Methods

### *Procedure*

LiTMUS was a six-month multisite, parallel-group, randomized comparative effectiveness trial. LiTMUS was designed to assess the efficacy of flexible, moderate doses of lithium in the context of optimized, personalized treatment (Li+OPT) compared with OPT without lithium. All participants were prescribed at least one mood stabilizer, as defined by the Texas Medication Algorithm Project (19). Details of the rationale, design, and methods of LiTMUS are reported elsewhere (20).

### *Participants*

The study protocol was approved by the institutional review boards of the six study sites, and participants

provided verbal and written informed consent prior to participation. A total of 283 individuals with bipolar disorder enrolled in LiTMUS between 2008 and 2009. The Cornell Service Index (CSI) was offered only at weeks 12 and 24; because of attrition before week 12, this report includes data from only 246 of the 283 participants. LiTMUS offered broad inclusion and limited exclusion criteria to achieve a diverse and relatively generalizable study population. Potential participants were excluded if they required acute or inpatient care or detoxification from alcohol, opiates, or barbiturates; were pregnant or breastfeeding; had renal impairment or high serum thyroid stimulating hormone concentration (either of which would put the patient at risk if assigned to the lithium condition); had previously experienced inadequate efficacy or tolerability in an adequate-lithium trial; required inpatient care; or could not comply with study procedures.

### *Measures*

To assess current and lifetime *DSM-IV* diagnoses of bipolar and comorbid axis I disorders among participants, we used clinician-administered structured diagnostic interviews, the Extended Mini-International Neuropsychiatric Interview, the Structured Clinical Interview, and the Structured Clinical Interview for *DSM-IV* Substance Use Disorder Module (21,22).

Mood symptoms, side effects, and functioning were assessed at each study visit. Single-blind raters and unblinded clinicians measured severity of bipolar symptoms with the Clinical Global Impression Scale for Bipolar Disorder Severity (CGI-BP-S), a modified version of the Clinical Global Impression Scale tailored for bipolar disorder (23). Depressive symptoms were assessed with the Montgomery-Åsberg Depression Rating Scale (MADRS) (24), and manic symptoms were assessed with the Young Mania Rating Scale (YMRS) (25).

Medication side effects were monitored with the Frequency and Intensity of Side Effects Rating (FISER), a reliable and validated self-report measure of intensity, frequency, and burden of side effects (26). To evaluate

overall functioning and life satisfaction, raters also completed the LIFE–Range of Impaired Functioning Tool (LIFE-RIFT) with participants at weeks 0, 12, and 24 (27).

Service utilization was assessed with the CSI (28), a standardized measure of health service use with good interrater and test-retest reliability among adults without cognitive impairment (28). This measure captures the previous three months of service use and records the type, provider, site, frequency, duration, and cost of visits. Every consultation, visit, or hospitalization, regardless of location or duration, was counted as one service used. Categories for all services include outpatient psychiatric or psychological, outpatient medical, professional support, and intensive services (including emergency department visit, inpatient hospitalization, and participation in a day treatment program). Providers listed on the CSI range from general physicians, psychiatrists, and psychologists to religious leaders, counselors, and peer supporters. Participants in LiTMUS completed the CSI at week 12 (services used in the first three months of the study) and week 24 (services used in the last three months of the study).

For the purpose of this article, general medical services are defined as medical visits and ambulatory visits, and counseling services encompass clinical case management, psychotherapy (individual, group, or couples-family therapy) and alcohol or drug treatment visits. Study visits were not included in the count of services utilized.

### *Statistical analysis*

All statistical analyses were completed with version 9.2 of Statistical Analysis Software. Using marginal models, we examined the relationship of clinical and demographic features with participants' use of services; model fit assumed a natural log link function, a Poisson variance, and a common within-patient association. Correlation matrices were estimated with generalized estimating equations. Assuming that each predictor variable had a similar effect in each 12-week period, we included in each model

a fixed effect for visit in order to adjust for any variability found between the two 12-week periods. We assumed a Poisson variance because count variables often arise from a Poisson distribution, and the log link function allows for ease of interpretation. Using this model specification, one can interpret the coefficient as an estimated incidence rate ratio (IRR) between levels of the given predictor variable. Empirical standard error estimates were used to test whether the coefficients (IRRs) were equal to the null value of 1.

Simple linear regression was used to test whether the mean of each continuous variable at week 12 differed significantly between therapy groups. Logistic regression was used to test whether the odds of seeing a therapist at week 12 were significantly different between dichotomized groups of each unordered categorical variable. We also conducted multivariate analyses to examine the association of service use with clinical variables. We used forward selection to build these models and used an entry level of  $p < .10$ .

Of the 283 randomly assigned participants, 246 had outcome data at week 12, and 236 continued to week 24. To examine the possible effects of attrition, we conducted *t* tests for continuous variables and Fisher's exact tests for categorical variables to compare the 37 participants who dropped out of the study before week 12 (not included in the above analyses for lack of CSI data) with the 246 participants who were included in our analyses.

A significance level of .05 was used to test each hypothesis, and because of the exploratory nature of this study, no adjustment for multiple hypothesis testing was made.

## Results

Participants in the two treatment groups (Li+OPT versus OPT only) did not significantly differ in the total number of services used in either 12-week period. There were also no significant associations between treatment group and use of medical services or counseling services. At week 12, the mean  $\pm$  SD number of total services reported to be used in

**Table 1**

Association between service use and clinical features of 246 outpatients with bipolar disorder<sup>a</sup>

Service type and variable <sup>b</sup>	Coefficient	Rate ratio	95% CI
All services			
CGI-BP-S	.07	1.07	.95–1.21
MADRS	.01	1.01 <sup>*c</sup>	1.00–1.03
YMRS	.02	1.02	1.00–1.05
LIFE-RIFT	.01	1.01	.97–1.05
Psychiatric comorbidities	.22	1.25 <sup>**</sup>	1.20–1.31
High lipid profiles	–.05	.95	.52–1.78
High fasting glucose	.35	1.42	.87–2.33
Obesity	–.29	.75 <sup>*c</sup>	.50–1.12
Anxiety disorder	.22	1.25 <sup>**</sup>	1.12–1.39
Medical services			
CGI-BP-S	.13	1.13 <sup>*</sup>	1.00–1.29
MADRS	.02	1.02 <sup>*</sup>	1.00–1.04
YMRS	.04	1.04 <sup>*c</sup>	1.00–1.08
LIFE-RIFT	.04	1.04	.99–1.09
Psychiatric comorbidities	.10	1.11 <sup>*</sup>	1.00–1.23
High lipid profiles	.29	1.33	.80–2.21
High fasting glucose	.80	2.22 <sup>**c</sup>	1.30–3.79
Obesity	.05	1.05	.65–1.69
Anxiety disorder	.04	1.00	.82–1.33
Counseling services			
CGI-BP-S	–.01	.99	.85–1.14
MADRS	.003	1.00	.99–1.02
YMRS	.01	1.01	.98–1.04
LIFE-RIFT	–.01	.99	.93–1.05
Psychiatric comorbidities	.30	1.35 <sup>**</sup>	1.26–1.45
High lipid profiles	–.37	.69	.31–1.51
High fasting glucose	–.62	.54 <sup>*c</sup>	.29–1.00
Obesity	–.52	.59	.34–1.05
Anxiety disorder	.44	1.55 <sup>**</sup>	1.28–1.87

<sup>a</sup> Values were adjusted for visit effect.

<sup>b</sup> CGI-BP-S, Clinical Global Impression Scale for Bipolar Disorder Severity; MADRS, Montgomery-Åsberg Depression Rating Scale; YMRS, Young Mania Rating Scale; LIFE-RIFT, LIFE–Range of Impaired Functioning Tool. “Psychiatric comorbidities” refers to the number of lifetime comorbid diagnoses detected on the Extended Mini-International Neuropsychiatric Interview. High lipid profiles indicate low-density lipoprotein cholesterol >150 mg/dl. Fasting glucose was considered high at >100 mg/dl. Obesity was defined as a body mass index >30 kg/m<sup>2</sup>. Anxiety disorder was indicated for patients with a diagnosis of panic disorder, phobia, obsessive-compulsive disorder, posttraumatic stress disorder, or generalized anxiety disorder.

<sup>c</sup> Remained significant in the multivariate analysis

\* $p < .05$ , \*\* $p < .01$

the prior three months was  $5.40 \pm 10.00$ . The 246 participants used  $1.07 \pm 2.17$  medical services and  $1.98 \pm 6.03$  counseling services. At week 24 ( $N=236$ ), they reported using  $5.90 \pm 11.20$  total services,  $1.31 \pm 3.23$  medical services, and  $1.81 \pm 4.98$  counseling services. The distribution of total services was positively skewed, with over 80% of participants ( $N=189$ ) recording between zero and ten service visits (range=0–93). Number of medical services and number of counseling services were also positively skewed but had lower counts than total number of services. This

was expected because we counted only a subset of total services.

We found that outpatients with higher depressive symptoms (on the MADRS) and manic symptoms (on the YMRS) had higher rates of using medical services (Table 1). Specifically, ten-unit increases in MADRS score and YMRS score resulted in a 20% and 48% increase, respectively, in rate of using medical services. MADRS, YMRS, and CGI-BP-S scores were marginally associated with total number of services ( $p < .06$ ). Therefore, a ten-unit increase on the MADRS and YMRS resulted in 14% and 25%



**Table 2**

Association of counseling service utilization and demographic features among outpatients with bipolar disorder<sup>a</sup>

Characteristic	Saw a counselor or therapist				p <sup>b</sup>
	No (N=198)		Yes (N=48)		
	N	%	N	%	
Age (mean±SD)	38.6±12.2		39.1±12.6		.83
Gender					.62
Male	82	82.0	18	18.0	
Female	116	79.5	30	20.5	
Ethnicity					.33
Hispanic or Latino	26	74.3	9	25.7	
Not Hispanic or Latino	171	81.4	39	18.6	
Marital status					.44
Single	69	77.5	20	22.5	
Never married	26	81.3	6	18.8	
Divorced or separated	44	81.5	10	18.5	
Married or living as married	56	82.4	12	17.6	
Widowed	3	100.0	0	—	
Years in U.S. (mean±SD)	37.3±13.0		37.5±12.9		.91
Number of children (mean±SD)	1.3±1.6		1.3±1.6		.98
Education					.14
Less than high school	14	82.4	3	17.6	
High school diploma or GED	44	88.0	6	12.0	
Some college	59	88.1	8	11.9	
Technical school or associate's degree	17	77.3	5	22.7	
College diploma	43	74.1	15	25.9	
Graduate or professional degree	21	65.6	11	34.4	
Employment status					.94
Employed	87	81.3	20	18.7	
Student	9	75.0	3	25.0	
Unemployed	56	75.7	18	24.3	
Disability benefit	35	83.3	7	16.7	
Retired	9	100.0	0	—	
Other	2	100.0	0	—	
Household income (\$)					.13
≤24,999	94	80.3	23	19.7	
25,000–49,999	47	92.2	4	7.8	
50,000–74,999	22	78.6	6	21.4	
≥75,000	34	69.4	15	30.6	

<sup>a</sup> A patient was defined as seeking therapy or counseling if he or she reported at week 12 on the Cornell Service Index seeing a psychologist, social worker, or other counselor.

<sup>b</sup> Determined with linear regression for continuous and ordinal categorical characteristics and logistic regression for unordered categorical characteristics. For unordered characteristics with more than two categories, the p value reflects a two-group comparison: for marital status, single and never married were compared with the remaining three; for education, no college was compared with some college; for employment, employed and student were compared with the remaining four categories.

higher rates, respectively, of using all services. A one-unit increase on the CGI-BP-S resulted in a 13% higher rate of using medical services. Adjusting for visit, analyses indicated that both side-effect intensity and side-effect interference (FISER) were associated with the use of all services such that a one-unit increase in side-effect intensity and interference resulted in an 11% and 17% increased rate, respectively, of using all services ( $p<.01$ ), but frequency of side

effects was not associated with use of treatment services.

Participants with psychiatric conditions comorbid with bipolar disorder had higher rates of using all types of treatment services as well as medical and counseling services specifically (all  $p<.05$ ) (Table 1). Each additional psychiatric comorbidity resulted in a 25% higher rate of using all services, a 35% higher rate of using counseling services, and an 11% higher rate of using medical services.

Those who had an anxiety disorder (posttraumatic stress disorder, panic disorder, agoraphobia, obsessive-compulsive disorder, generalized anxiety disorder, social phobia, or a specific phobia) had a 25% higher rate of using all types of treatment services (Table 1). Given the association of anxiety disorders and use of services, we conducted follow-up analyses to examine specific anxiety disorders. We found a strong association between using more treatment services and having obsessive-compulsive disorder (IRR=2.21,  $p<.01$ ) but not panic, phobia, generalized anxiety disorder, or posttraumatic stress disorder.

In regard to medical comorbidities, participants with high (exceeding 100 mg/dl) versus normal fasting plasma glucose used more than twice as many medical services but nearly half (46%) as many counseling services (Table 1).

Each multivariate model included an effect for time, forced into the model during variable selection, and considered the entry of all covariates in Table 1. The effects in the multivariate analysis were adjusted for all other covariates that entered the model. Analyses showed that number of psychiatric comorbidities (IRR=1.29,  $p=.003$ ), obesity (IRR=.63,  $p=.03$ ), and side-effect interference (IRR=1.19,  $p=.02$ ) independently predicted use of all services. High glucose (IRR=2.25,  $p=.002$ ) independently predicted use of medical services, and manic symptoms marginally predicted use of medical services (IRR=1.04,  $p=.07$ ). High glucose (IRR=.53,  $p=.05$ ) and side-effect interference (IRR=1.21,  $p=.02$ ) predicted use of counseling services.

Participants who were older (middle age) (IRR=1.02,  $p=.01$ ), had lived in the United States longer (IRR=1.02,  $p=.01$ ), and were unemployed (IRR=1.84,  $p=.01$ ) had higher rates of using all services, whereas use of psychotherapy was not significantly associated with any demographic or clinical variable (Tables 2 and 3).

In regard to the attrition analyses, we found that the dropout group had a higher proportion of men ( $p=.04$ ), single or never-married individuals ( $p=.04$ ), unemployed individuals ( $p=.04$ ), and diagnosis of a substance use disorder ( $p=.02$ ).

**Table 3**Association of counseling service utilization and clinical features of 246 outpatients with bipolar disorder<sup>a</sup>

Characteristic <sup>b</sup>	Did not see a therapist or counselor						Saw a therapist or counselor						p <sup>c</sup>
	Total N	N	%	95% CI	Range	Median	Total N	N	%	95% CI	Range	Median	
Age at first depressive symptoms (mean±SD)	196	16.4±8.4		15.2–17.6	2–55	15	46	16.3±5.8		14.6–18.0	5–30	16	.97
Age at first hypomania symptoms (mean±SD)	182	18.5±8.4		17.2–19.7	5–48	16	46	18.4±8.4		15.9–20.9	2–42	18	.95
Bipolar diagnosis													.13
Type I		144	78.3					40	21.7				
Type II		54	87.1					8	12.9				
CGI-BP-S (mean±SD)	196	3.3±1.4		3.1–3.5	1–7	3	48	3.2±1.3		2.9–3.6	1–6	4	.82
MADRS (mean±SD)	196	16.1±11.5		14.5–17.7	0–46	16	48	14.9±9.2		12.2–17.6	0–37	14	.50
YMRS (mean±SD)	196	7.4±6.9		6.5–8.4	0–30	6	48	7.0±6.3		5.2–8.8	0–27	6	.68
LIFE-RIFT (mean±SD)	195	11.4±4.0		10.8–12.0	4–20	11	48	11.2±3.3		10.2–12.1	5–19	11	.71
Suicide attempts													.29
Yes		74	77.1					22	22.9				
No		123	82.6					26	17.4				
Any anxiety disorder <sup>d</sup>													.34
Yes		114	82.6					24	17.4				
No		84	77.8					24	22.2				
Any substance use disorder <sup>e</sup>													.41
Yes		90	78.3					25	21.7				
No		108	82.4					23	17.6				

<sup>a</sup> A patient was defined as seeking therapy or counseling if he or she reported at week 12 on the Cornell Service Index seeing a psychologist, social worker, or other counselor.<sup>b</sup> CGI-BP-S, Clinical Global Impression Scale for Bipolar Disorder Severity; MADRS, Montgomery-Åsberg Depression Rating Scale; YMRS, Young Mania Rating Scale; LIFE-RIFT, LIFE–Range of Impaired Functioning Tool. Ranges shown are scores per group.<sup>c</sup> The p values were determined with linear regression for continuous characteristics and logistic regression for unordered categorical characteristics.<sup>d</sup> Coded yes if the patient had a diagnosis of posttraumatic stress disorder, panic disorder, agoraphobia, obsessive-compulsive disorder, generalized anxiety disorder, social phobia, or specific phobia.<sup>e</sup> Coded yes if the patient met the threshold for any substance use disorder on the Structured Clinical Interview for DSM-IV.

## Discussion

Individuals with bipolar disorder experience a substantial burden of medical and psychiatric comorbidity, yet reports of how they use treatment services have been inconsistent (2–5,7,8). This study contributes to the limited but emerging literature on service utilization in a relatively representative population of outpatients with bipolar disorder. Neither randomization to low or moderate doses of lithium compared with no lithium nor progression from week 12 to week 24 of the study appeared to affect service utilization, but we found several predictors of differential service use among outpatients with bipolar disorder. This study furthers our understanding of health behavior (personal health practices and use of

health services), a key component of understanding health service use and improving outcomes, including perceived and evaluated health status and consumer satisfaction (29).

Current psychological symptoms of bipolar disorder were associated with increased utilization of medical services, but not counseling services. Furthermore, compared with depressive symptoms, manic symptoms were more strongly associated with service utilization. Thus it seems that a more severe course of mental illness (particularly mania) may encourage seeking treatment for general physical but not psychological problems. Of note, only the association with mania persisted when the multivariate analyses were conducted, suggesting that several of the variables (depression and

anxiety, for example) were collinear or did not independently have strong effects on service utilization (Table 1).

Participants who rated their side effects as more intense, frequent, and burdensome tended to seek not only medical services but also counseling and more overall services than sought by other participants—a finding that persisted in the multivariate analyses. These data suggest that physical symptoms, as opposed to psychiatric and mood symptoms, may prompt individuals with bipolar disorder to seek counseling services. Physical symptoms may have less mutable characteristics (degree to which they can change service utilization), but they still have some degree of mutability, and this finding can inform clinicians about whom to target for

services (such as individuals with high psychological distress) (29). These discrepant findings highlight the need for future research to assess the demographic and psychiatric correlates of seeking counseling services, particularly because other studies have found that individuals with bipolar disorder do not tend to seek counseling services (30,31).

We also found that among participants with bipolar disorder, characteristics with low to no degree of mutability generally predicted their likelihood to seek services and specifically predicted utilization among those who were of middle age, who lived in the United States longer compared with others, and who were unemployed. These findings suggest that individuals who are younger, recent immigrants, or unemployed may underutilize services and could benefit from close monitoring by providers when they do seek services. We also found that men, single or never-married participants, unemployed participants, and substance users tended to drop out of the study at greater rates than others, which may suggest that these individuals are at higher risk for not adequately using medical services.

Psychiatric comorbidities, particularly anxiety disorders, predicted higher rates of using all treatment services, further suggesting that individuals with more comorbid diagnoses have more insight into their need for help and thus seek more treatment services than individuals with just one diagnosis (15). Anxiety has been shown to increase concern for one's health and report of somatic symptoms (32). High glucose levels predicted the use of medical and counseling services (also shown in the multivariate models). In the multivariate model, obesity predicted the use of all services but not counseling or medical services specifically. These latter findings are particularly notable because obesity is associated with low utilization of counseling services (33), which in turn may contribute to how this condition affects individuals' overall health (34). The known health risks of obesity alone (35), compounded by the worsened outcomes seen among

obese patients with bipolar disorder (36), highlight the importance of understanding the complex relationships between obesity and use of services because this will further our knowledge of both predisposing (demographic characteristics and comorbid diagnoses) and need (perceived and evaluated illness) factors of health utilization (37).

These results are consistent with extant research showing that bipolar disorder renders high medical service utilization and associated costs for both patients and their insurance companies (10,38,39). Consequently, general medical providers may be treating symptoms or comorbid conditions of bipolar disorder, such as depressed mood, insomnia, fatigue, agitation, cardiovascular disease (40), or respiratory disorders (7), as well as observing patterns of increased treatment utilization without necessarily being aware of the bipolar diagnosis. This highlights the possibility of fragmented care for this group of patients, who often have multiple symptoms; coordinated prevention management of bipolar disorder would likely decrease its financial burden and improve the likelihood of sustained remission (10,41).

Interpretation of these results must be considered within the context of the methodological limitations. First, the CSI does not differentiate between using multiple services and using the same service multiple times, nor does it capture reasons for seeking a service or distinguish between general and specialized care. Second, the study relied on patient self-reports of service utilization and did not assess whether participants used services appropriate for their individual needs. Observations were not purely naturalistic, given that they were collected in the context of a clinical trial, and thus limit the generalizability of the findings. This context could influence service use, either increasing it as frequent study visits made participants more aware of health care needs or decreasing it as the clinical trial offered consistent clinical attention. Furthermore, although diverse, the study population comprised individuals willing to participate in research and thus cannot fully represent the

entire population with bipolar disorder. The largely null results for the use of counseling services may be accounted for by a potential statistical power issue in that few participants sought such services and did so infrequently. Finally, the direction of causality of these relationships is speculative.

## Conclusions

In short, our data show that outpatients with bipolar disorder sought medical and counseling services at specific times in their course of illness and overall health. Results suggest that treatment providers should pay special attention to characteristics with low mutability (middle age, recent immigration, or current unemployment) to ensure that persons have equitable access to health services (29). Data also highlight characteristics with higher mutability, such as worsening manic symptoms and high burden of side effects, to help providers determine areas of focus in their treatment planning and evaluations. Overall, these analyses helped to clarify the behavioral health service model for bipolar disorder by offering data on both population characteristics (predisposing and need factors) and health behavior (personal health practices and use of health services); this information will ultimately help to optimize overall outcomes (perceived and evaluated health outcomes and consumer satisfaction) (28,37).

## Acknowledgments and disclosures

This study was funded by contract NO1MH80001 from the National Institute of Mental Health.

Dr. Sylvia was a shareholder in Concordant Rater Systems and serves as a consultant for United Biosource Corporation and Clintara. She receives royalties from New Harbinger. Dr. Iosifescu is a consultant for CNS Response and Servier. Dr. Friedman receives grant support from AstraZeneca Pharmaceuticals, Medtronic, Novartis, Repligen, Roche, St. Jude Medical, and Takeda. He receives royalties from Springer. Dr. Ketter receives research support from AstraZeneca, Cephalon, Eli Lilly and Company, Pfizer, and Sunovion Pharmaceuticals. He receives consultant fees from Allergan, Avanir Pharmaceuticals, Bristol-Myers Squibb Company, Cephalon, Forest Pharmaceuticals, Janssen Pharmaceutica Products, Merck & Co., Sunovion, and Teva Pharmaceuticals. He has received lecture honoraria from Abbott Laboratories, AstraZeneca, GlaxoSmithKline, and Otsuka Pharmaceuticals and receives publication royalties from American



Psychiatric Publishing. In addition, Dr. Ketter's spouse is an employee of and holds stock in Janssen. Dr. Reilly-Harrington receives royalties from Oxford University Press and the American Psychological Association and serves as a consultant for United Biosource Corporation. Dr. Leon served on independent data and safety monitoring boards for AstraZeneca, Sunovion, and Pfizer. He served as a consultant and advisor to MedAvante and Roche and had equity in MedAvante. Dr. Calabrese receives research funding or grants from the following private industries or nonprofit funds: Brain and Behavior Research Foundation (formerly NARSAD), Cleveland Foundation, and Stanley Medical Research Institute; he receives research grants from Abbott, AstraZeneca, Cephalon, GlaxoSmithKline, Janssen, Eli Lilly, and Lundbeck; he serves on the advisory boards of Abbott, AstraZeneca, Bristol-Myers Squibb, Daiippon Sumitomo Pharma, Forest, France Foundation, GlaxoSmithKline, Janssen, NeuroSearch, OrthoMcNeil, Repligen, Schering-Plough, Servier, Solvay/Wyeth, Takeda, and Supernus Pharmaceuticals; and he reports continuing medical education activities with AstraZeneca, Bristol-Myers Squibb, France Foundation, GlaxoSmithKline, Janssen, Johnson & Johnson, Schering-Plough, and Solvay/Wyeth. Dr. Ostacher has served as a consultant for Alexza Pharmaceuticals, Bristol Myers Squibb, Eli Lilly, Janssen, Otsuka, and Sunovion. Dr. Thase has, during the past three years, been an advisor or consultant to Alkermes, Allergan, AstraZeneca, Bristol-Myers Squibb, Eli Lilly, Forest Laboratories, GlaxoSmithKline, Janssen, Lundbeck, MedAvante, Merck, Mylan, Neuronetics, Otsuka, Pamlab, Pfizer, PharmaNeuroboost, Roche, Shire, Sunovion, Takeda, and Teva. During the same time frame, he received honoraria for continuing education talks that were supported by AstraZeneca, Bristol-Myers Squibb, Merck, and Pfizer, and he has received research grants from Alkermes, AstraZeneca, Eli Lilly, Forest, GlaxoSmithKline, Otsuka, PharmaNeuroboost, and Roche. Dr. Nierenberg is a consultant for Abbott Laboratories, AstraZeneca, Basilea, BrainCells Inc., Brandeis University, Bristol-Myers Squibb, Cephalon, Corcept, Eli Lilly, Forest, Genaisance, GlaxoSmithKline, Innapharma, Janssen, Jazz Pharmaceuticals, Lundbeck, Merck, Novartis, PamLabs, Pfizer, PGx Health, Ridge Diagnostics, Roche, Sepracor, Schering-Plough, Shire, Somerset, Sunovion, Takeda, Targacept, and Teva. He is a stakeholder in Appliance Computing, Inc. (MindSite); Brain Cells, Inc.; and InfoMed (potential share of income). He receives research support from Brain and Behavior Research Foundation, Bristol-Myers Squibb, Cederroth, Cyberonics, Elan, Forest Pharmaceuticals, GlaxoSmithKline, Janssen, Lichtwer Pharma, Eli Lilly, Mylan, PamLabs, Pfizer, Shire, Stanley Foundation, and Wyeth-Ayerst. Honoraria include MGH Psychiatry Academy. He receives other income from CRICO for legal case reviews, from MBL Publishing for past services as Editor-in-Chief of *CNS Spectrums*, from Slack Inc. for services as associate editor of *Psychiatric Annals*, and from Belvoir Publications for serving on the editorial board of *Mind Mood Memory*. He has joint copyright ownership with MGH for the Structured Clinical Interview for

MADRS and Clinical Positive Affect Scale. He receives additional honoraria from ADURS, American Society for Clinical Psychopharmacology, AstraZeneca, Biomedical Development, Brandeis University, East Asian Bipolar Forum, Eli Lilly, Forest, Harold Grinspoon Charitable Foundation, Health New England, International Society for Bipolar Disorder, Janssen, Mid-Atlantic Permanente Research Institute, University of Pisa, University Texas Southwest at Dallas, University of Wisconsin-Madison, Up-to-Date, and Zucker Hillside Hospital. The other authors report no competing interests.

## References

- Salvatore P, Tohen M, Khalsa HM, et al: Longitudinal research on bipolar disorders. *Epidemiologia e Psichiatria Sociale* 16: 109–117, 2007
- Kilbourne AM, Cornelius JR, Han X, et al: Burden of general medical conditions among individuals with bipolar disorder. *Bipolar Disorders* 6:368–373, 2004
- Hsieh MH, Tang CH, Hsieh MH, et al: Medical costs and vasculometabolic comorbidities among patients with bipolar disorder in Taiwan: a population-based and matched-control study. *Journal of Affective Disorders* 141:449–456, 2012
- Krishnan KR: Psychiatric and medical comorbidities of bipolar disorder. *Psychosomatic Medicine* 67:1–8, 2005
- Kemp DE, Sylvia LG, Calabrese JR, et al: General medical burden in bipolar disorder: findings from the LiTMUS comparative effectiveness trial. *Acta Psychiatrica Scandinavica* (Epub ahead of print, March 7, 2013)
- Jerrell JM, McIntyre RS, Tripathi A: A cohort study of the prevalence and impact of comorbid medical conditions in pediatric bipolar disorder. *Journal of Clinical Psychiatry* 71:1518–1525, 2010
- McIntyre RS, Konarski JZ, Soczynska JK, et al: Medical comorbidity in bipolar disorder: implications for functional outcomes and health service utilization. *Psychiatric Services* 57:1140–1144, 2006
- Perron BE, Howard MO, Nienhuis JK, et al: Prevalence and burden of general medical conditions among adults with bipolar I disorder: results from the National Epidemiologic Survey on Alcohol and Related Conditions. *Journal of Clinical Psychiatry* 70:1407–1415, 2009
- Stender M, Bryant-Comstock L, Phillips S: Medical resource use among patients treated for bipolar disorder: a retrospective, cross-sectional, descriptive analysis. *Clinical Therapeutics* 24:1668–1676, 2002
- Peele PB, Xu Y, Kupfer DJ: Insurance expenditures on bipolar disorder: clinical and parity implications. *American Journal of Psychiatry* 160:1286–1290, 2003
- Rajagopalan K, Kleinman NL, Brook RA, et al: Costs of physical and mental comorbidities among employees: a comparison of those with and without bipolar disorder. *Current Medical Research and Opinion* 22: 443–452, 2006
- Cradock-O'Leary J, Young AS, Yano EM, et al: Use of general medical services by VA patients with psychiatric disorders. *Psychiatric Services* 53:874–878, 2002
- Chatterjee S, Rath ME, Spiro A III, et al: Gender differences in Veterans Health Administration mental health service use: effects of age and psychiatric diagnosis. *Women's Health Issues* 19:176–184, 2009
- Chwastiak LA, Rosenheck RA, Kazis LE: Utilization of primary care by veterans with psychiatric illness in the National Department of Veterans Affairs Health Care System. *Journal of General Internal Medicine* 23:1835–1840, 2008
- Mojtabai R, Olfson M, Mechanic D: Perceived need and help-seeking in adults with mood, anxiety, or substance use disorders. *Archives of General Psychiatry* 59: 77–84, 2002
- Minsky S, Etz RS, Gara M, et al: Service use among patients with serious mental illnesses who presented with physical symptoms at intake. *Psychiatric Services* 62:1146–1151, 2011
- McCarthy JF, Valenstein M, Zivin K, et al: Access-related measures and out-of-system utilization among veterans with bipolar disorder. *Psychiatric Services* 61:1035–1038, 2010
- Kupfer DJ, Frank E, Grochocinski VJ, et al: African-American participants in a bipolar disorder registry: clinical and treatment characteristics. *Bipolar Disorders* 7:82–88, 2005
- Suppes T, Dennehy EB, Hirschfeld RM, et al: The Texas implementation of medication algorithms: update to the algorithms for treatment of bipolar I disorder. *Journal of Clinical Psychiatry* 66:870–886, 2005
- Nierenberg AA, Sylvia LG, Leon AC, et al: Lithium Treatment-Moderate Dose Use Study (LiTMUS) for bipolar disorder: rationale and design. *Clinical Trials* 6: 637–648, 2009
- Sheehan DV, Lecrubier Y, Sheehan KH, et al: The Mini-International Neuropsychiatric Interview (MINI): the development and validation of a structured diagnostic psychiatric interview for DSM-IV and ICD-10. *Journal of Clinical Psychiatry* 59(suppl 20):22–33, quiz 34–57, 1998
- Sheehan DV, Sheehan KH, Shytle RD, et al: Reliability and validity of the Mini International Neuropsychiatric Interview for Children and Adolescents (MINI-KID). *Journal of Clinical Psychiatry* 71: 313–326, 2010
- Spearing MK, Post RM, Leverich GS, et al: Modification of the Clinical Global Impressions (CGI) Scale for use in bipolar illness (BP): the CGI-BP. *Psychiatry Research* 73:159–171, 1997
- Montgomery SA, Asberg M: A new depression scale designed to be sensitive to change. *British Journal of Psychiatry* 134: 382–389, 1979
- Young RC, Biggs JT, Ziegler VE, et al: A rating scale for mania: reliability, validity and sensitivity. *British Journal of Psychiatry* 133:429–435, 1978

26. Wisniewski SR, Rush AJ, Balasubramani GK, et al: Self-rated global measure of the frequency, intensity, and burden of side effects. *Journal of Psychiatric Practice* 12: 71–79, 2006
27. Leon AC, Solomon DA, Mueller TI, et al: A brief assessment of psychosocial functioning of subjects with bipolar I disorder: the LIFE-RIFT. Longitudinal Interval Follow-up Evaluation–Range Impaired Functioning Tool. *Journal of Nervous and Mental Disease* 188:805–812, 2000
28. Sirey JA, Meyers BS, Teresi JA, et al: The Cornell Service Index as a measure of health service use. *Psychiatric Services* 56: 1564–1569, 2005
29. Andersen RM: Revisiting the behavioral model and access to medical care: does it matter? *Journal of Health and Social Behavior* 36:1–10, 1995
30. Harpaz-Rotem I, Libby D, Rosenheck RA: Psychotherapy use in a privately insured population of patients diagnosed with a mental disorder. *Social Psychiatry and Psychiatric Epidemiology* 47:1837–1844, 2012
31. Zeber JE, Copeland LA, McCarthy JF, et al: Perceived access to general medical and psychiatric care among veterans with bipolar disorder. *American Journal of Public Health* 99:720–727, 2009
32. Haug TT, Mykletun A, Dahl AA: The association between anxiety, depression, and somatic symptoms in a large population: the HUNT-II study. *Psychosomatic Medicine* 66:845–851, 2004
33. Goodrich DE, Lai Z, Lasky E, et al: Access to weight loss counseling services among patients with bipolar disorder. *Journal of Affective Disorders* 126:75–79, 2010
34. Bertakis KD, Azari R: Obesity and the use of health care services. *Obesity Research* 13:372–379, 2005
35. Kopelman P: Health risks associated with overweight and obesity. *Obesity Reviews* 8 (suppl 1):13–17, 2007
36. Fagiolini A, Kupfer DJ, Houck PR, et al: Obesity as a correlate of outcome in patients with bipolar I disorder. *American Journal of Psychiatry* 160:112–117, 2003
37. Phillips KA, Morrison KR, Andersen R, et al: Understanding the context of healthcare utilization: assessing environmental and provider-related variables in the behavioral model of utilization. *Health Services Research* 33:571–596, 1998
38. Simon GE, Unützer J: Health care utilization and costs among patients treated for bipolar disorder in an insured population. *Psychiatric Services* 50:1303–1308, 1999
39. Chatterton ML, Ke X, Lewis BE, et al: Impact of bipolar disorder on the family: utilization and cost of health care resources. *Pharmacy and Therapeutics* 33:15–34, 2008
40. Goldstein BI, Fagiolini A, Houck P, et al: Cardiovascular disease and hypertension among adults with bipolar I disorder in the United States. *Bipolar Disorders* 11: 657–662, 2009
41. Young AH, Rigney U, Shaw S, et al: Annual cost of managing bipolar disorder to the UK healthcare system. *Journal of Affective Disorders* 133:450–456, 2011

## Submissions Invited for Datapoints Column

Datapoints encourages the rapid dissemination of relevant and timely findings related to clinical and policy issues in psychiatry. National or international data, especially from large representative databases, are preferred. The editors are particularly interested in data that can be accessed by other researchers. Topics may include differences or trends in diagnosis and practice patterns or in treatment modalities, especially across different care settings or in the context of new policies or payment sources. The analyses should be straightforward, so that the data displayed tell a clear story. The text should follow the standard research format and include a brief introduction, description of the methods and data set, description of the results, and comments on the implications or meanings of the findings.

Datapoints columns must include one figure or table, and because the column is limited to one printed page, it is therefore limited to 350–400 words. Submissions with multiple authors are discouraged because of space constraints; submissions with more than four authors should include justification for additional authors.

Inquiries or submissions should be directed to column editors Amy M. Kilbourne, Ph.D., M.P.H. (amykilbo@umich.edu), or Tami L. Mark, Ph.D. (tami.mark@truvenhealth.com).