

# Cost-effectiveness and Cost Offset of a Collaborative Care Intervention for Primary Care Patients With Panic Disorder

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**Background:** A collaborative care (CC) intervention for patients with panic disorder that provided increased patient education and integrated a psychiatrist into primary care was associated with improved symptomatic and functional outcomes. This report evaluates the incremental cost-effectiveness and potential cost offset of a CC treatment program for primary care patients with panic disorder from the perspective of the payer.

**Methods:** We randomly assigned 115 primary care patients with panic disorder to a CC intervention that included systematic patient education and approximately 2 visits with an on-site consulting psychiatrist, compared with usual primary care. Telephone assessments of clinical outcomes were performed at 3, 6, 9, and 12 months. Use of health care services and costs were assessed using administrative data from the primary care clinics and self-report data.

**Results:** Patients receiving CC experienced a mean of 74.2 more anxiety-free days during the 12-month intervention (95% confidence interval [CI], 15.8-122.0). The

incremental mental health cost of the CC intervention was \$205 (95% CI, -\$135 to \$501), with the additional mental health costs of the intervention explained by expenditures for antidepressant medication and outpatient mental health visits. Total outpatient cost was \$325 (95% CI, -\$1460 to \$448) less for the CC than for the usual care group. The incremental cost-effectiveness ratio for total ambulatory cost was -\$4 (95% CI, -\$23 to \$14) per anxiety-free day. Results of a bootstrap analysis suggested a 0.70 probability that the CC intervention was dominant (eg, lower costs and greater effectiveness).

**Conclusion:** A CC intervention for patients with panic disorder was associated with significantly more anxiety-free days, no significant differences in total outpatient costs, and a distribution of the cost-effectiveness ratio based on total outpatient costs that suggests a 70% probability that the intervention was dominant, compared with usual care.

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**P**ANIC DISORDER occurs in 4% to 6% of patients in primary care.<sup>1</sup> This severe anxiety disorder is associated with high use of medical services, high costs,<sup>2,3</sup> multiple medically unexplained symptoms such as chest pain and palpitations,<sup>4,6</sup> and as much impairment in social and vocational roles as with most chronic medical illnesses.<sup>7</sup> The costs to society are also high, as evidenced by a recent longitudinal study that found that patients with panic disorder had the highest odds ratio of becoming recipients of disability payments during a 1-year period.<sup>8</sup>

Patients with panic disorder frequently do not receive an accurate diagnosis in primary care.<sup>1</sup> Even when the diagnosis is assigned, few patients receive evidenced-based pharmacological treatment or psychotherapy.<sup>9,10</sup> We recently reported the results of a randomized trial test-

ing the effectiveness of a collaborative care (CC) intervention vs usual primary care (UC) in patients with panic disorder in 3 primary care clinics.<sup>11</sup> The CC intervention provided enhanced patient education and added approximately 2 visits with a psychiatrist integrated into the primary care setting to help the primary care physician with pharmacological management.<sup>11</sup> This intervention was associated with improved adherence to guideline-level antipanic medication management and improved symptomatic and functional outcomes compared with the UC regimen.<sup>11</sup>

Cost-effectiveness analyses have been completed for similar trials of collaborative interventions for patients with major depression in primary care.<sup>12,13</sup> These trials compared the ratio of incremental costs to benefits and showed that for incremental outpatient costs of \$250 to \$500, CC interventions improved outcomes from ap-

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proximately 40% recovery with UC to 70% to 75% with CC.<sup>12,13</sup> In this study, we analyzed the medical costs and anxiety outcomes of patients randomized to a CC intervention for panic disorder vs those treated with UC to answer the following questions: (1) What is the incremental cost-effectiveness of CC compared with UC? and (2) Is there evidence of a medical cost offset associated with a CC intervention for patients with panic disorder?

## METHODS

### STUDY SETTINGS

Settings for this study were 3 primary care clinics in the Seattle, Wash, area. Two university-associated internal medicine clinics care for 8000 and 6000 patients (50%-60% with private insurance). Thirty attending primary care physicians provide 70% of care, and rotating medical residents provide the remainder. At the third community family medicine clinic, part of a multisite health care system, 8 attending primary care physicians care for approximately 10000 patients (80%-90% with private insurance).

### ELIGIBILITY FOR RANDOMIZATION

Patients were required to be aged 18 to 65 years and to meet DSM-IV criteria for panic disorder with at least 1 panic attack in the past month. We accepted all psychiatric and physical comorbidities except those that were potentially life-threatening (eg, active suicidal ideation or terminal medical illness) or that would limit patient participation or adherence to the protocol (eg, psychosis, current substance abuse, dementia, and pregnancy). Patients had to be English speaking and have a telephone to complete all follow-up assessments. We excluded patients currently receiving psychiatric treatment and those currently receiving or applying for disability benefits. All physicians were informed about the study, and referrals from physicians were encouraged. However, we also recruited patients by means of a waiting-room procedure with a 2-question panic disorder screen that has previously been demonstrated to be highly sensitive to panic disorder.<sup>14</sup> All patients with positive screening results or with referrals received diagnostic interviews by telephone to determine final eligibility. The study procedure was approved by the Institutional Review Board of the University of Washington Medical School, Seattle. Eligible patients were asked to provide informed consent to participate in a randomized trial of an intervention designed to improve care for panic disorder.

Patients were randomized, using a random number table, to the CC model, in which they received acute-phase treatment in the primary care setting from the consulting psychiatrist and the primary care physician in the first 3 months, followed by a handoff to a primary care physician who continued to follow up the patient, or to the UC model. Patients randomized to UC received treatment as usual from their primary care physician in the clinic, who received the results of the initial diagnostic telephone assessment to eliminate nonrecognition of panic and associated disorders as a factor in outcome. Patients in the UC group could also be referred to university or community mental health practitioners. Randomization was stratified according to whether patients had been referred or had undergone screening and whether they had an additional comorbid Axis I diagnosis.

### INTERVENTION

A multifaceted intervention was developed to target the patient, physician, and process-of-care variables. Patients were pro-

vided an initial psychiatric visit, at which time they were prescribed the selective serotonin reuptake inhibitor (SSRI) paroxetine, unless they had shown a previous nonresponse to or intolerance of this medication, in which case another SSRI was prescribed. The paroxetine dosage was started at 10 mg/d and increased to 20 mg/d as tolerated in the second week and to 40 mg/d by the fourth week if no response was reported and the patient was able to tolerate it. On the day of randomization, the CC patients were also mailed an educational videotape and a pamphlet describing the nature of panic disorder, its ability to mimic other medical illnesses, the effectiveness of medication treatment when continued for a sufficient time, and a model of how medications work in the brain. These points were reemphasized during the visits to the psychiatrist. Follow-up psychiatric telephone calls and a second visit were offered to address problems with adverse effects or with the implications of the panic disorder diagnosis.

Before participating in the randomized trial, all physicians received a 1-hour instruction on recognition and antidepressant treatment of panic disorder and a published medication algorithm<sup>15</sup> outlining appropriate types of medications and dosing strategies for patients with panic disorder. The intervention was intended to improve physicians' knowledge and to reduce unnecessary medical testing for somatic symptoms of panic attacks. Previous CC studies<sup>16,17</sup> showed differences compared with UC, despite provision of this type of information to all physicians.

The psychiatrist saw the CC patients for an hour during the first week after the referral, telephoned them during the second week, scheduled a follow-up 30-minute visit during the fourth week, and called them again during the sixth to eighth weeks. Selected patients with persistent symptoms were occasionally seen for up to 3 extra sessions. After acute-phase treatment, psychiatrists followed up patients with approximately 1 brief telephone call (5 minutes) every 3 months during continuation-phase treatment (3-12 months).

### ASSESSMENTS

Patients underwent assessment at 3-month intervals by telephone interviewers with bachelor-level psychology degrees. The interviewers were masked to the patients' randomized status. The interviewers watched an instructional video about panic disorder, read an instructional manual describing the telephone interview, performed 5 mock interviews, and completed 4 interviews with an experienced interviewer monitoring the procedure and checking for reliability. The interview included portions of the Composite International Diagnostic Interview modified for DSM-IV.<sup>18</sup> This interview has acceptable reliability for mood and anxiety disorder diagnoses when used by nonclinician interviewers.<sup>19-21</sup> Such telephone-structured psychiatric interviews have high concordance with in-person interviews.<sup>22</sup> The interview also included the Anxiety Sensitivity Inventory (ASI), which is a core measure of panic disorder apprehension and discomfort about psychological and physical symptoms of anxiety.<sup>23</sup> The ASI predicts risk for panic, maintenance of panic in the absence of treatment, and long-term outcome; the ASI measure is hypothesized to be an underlying genetically determined temperamental trait in patients with panic disorder.<sup>24</sup> Changes in the ASI have been shown in panic treatment studies to have a high correlation with independent clinician ratings of recovery and to have larger effect sizes than those attained with other anxiety self-report measures.<sup>25</sup> Functional impairment was measured using the Panic Disorder Severity Scale.<sup>26</sup> The Cumulative Illness Rating Scale (CIRS) was used to measure the degree of medical comorbidity.<sup>27</sup> The CIRS uses medical chart review to record types and severity of medical problems.

Information on patient use of intervention psychiatrist services was obtained from records maintained for the effectiveness trial. Information regarding use of selected services (physician visits, visits to other health care providers, laboratory tests, procedures, x-rays, visits to other mental health care providers, and hospitalizations) within the patients' health care centers was obtained from administrative databases kept by the 3 clinics. Information regarding the use of outside providers and of pharmacological treatments was obtained through telephone interviews during each 3-month follow-up. The interview questions were developed for the Partners in Care Study.<sup>28</sup> All visits were classified as medical or mental health, depending on the qualifications of the provider and the code for diagnosis used in primary care visits. We collected data on the percentage of patients hospitalized and the percentage of days in the hospital, but did not enter these data in cost-effectiveness analyses because we had no a priori hypothesis that our intervention would affect inpatient hospital costs.

Direct costs were estimated and included those of medical services and those involved in administering treatments during the 1-year study. All units of service were assigned standard procedure codes (eg, *Current Procedural Terminology, Fourth Revision* codes for procedures, *International Classification of Diseases, Ninth Revision* diagnostic codes for visits, National Drug Codes for prescribed medication, and diagnosis related groups for hospitalizations). These codes were translated into unit prices using the 2000 Medicare payment rates for visits of different types, laboratory and blood tests, medical/surgical procedures, and other medical tests.<sup>29</sup> Medication costs were estimated using 1998 Redbook average wholesale prices (First Data Bank, San Bruno, Calif) for prescribed drugs. Cost for the intervention psychiatrist visits were calculated using Medicare *Current Procedural Terminology* codes for a 1½-hour initial visit and half-hour return visits.

### CLINICAL EFFECTIVENESS

We used a method developed by Lave et al<sup>30</sup> to derive an overall indicator of clinical outcomes called anxiety-free days (AFDs). At each assessment (baseline, 3, 6, 9, and 12 months), the ASI was administered.<sup>23</sup> Each day of the year is assigned a value between 1 (anxiety free) and 0 (fully symptomatic). For each 3-month interval, the number of AFDs was calculated on the basis of a linear interpolation of the ASI ratings at the beginning and at the end of the period. The number of AFDs was then summed across the 4 periods to get a 12-month total for each patient. On the basis of the baseline mean ASI score of our sample of patients with panic disorder, we defined *fully symptomatic* as an ASI score of greater than 30 (based on the mean at baseline in our sample of 29.3), and *anxiety free* as an ASI score of less than 20. A score of less than 20 was chosen to represent an AFD because a review of multiple psychotherapy and psychopharmacological efficacy studies in patients with panic disorder showed that ASI scores in intervention groups clustered around a mean of 20 at the end point of the trials.<sup>24,25</sup> Thus, if a patient scored above 30, they were assumed to lack an AFD; if they scored below 20, they were assumed to have a full AFD; and if they scored from 20 to 30, the day was weighted proportionally. We also conducted sensitivity analyses using varying thresholds for *anxiety free* (ASI score, 18-22) and *fully symptomatic* (ASI score, 28-32). These alternatives yielded different values for AFDs, but had minimal impact (<10% change) on the difference in AFDs between the CC and UC groups.

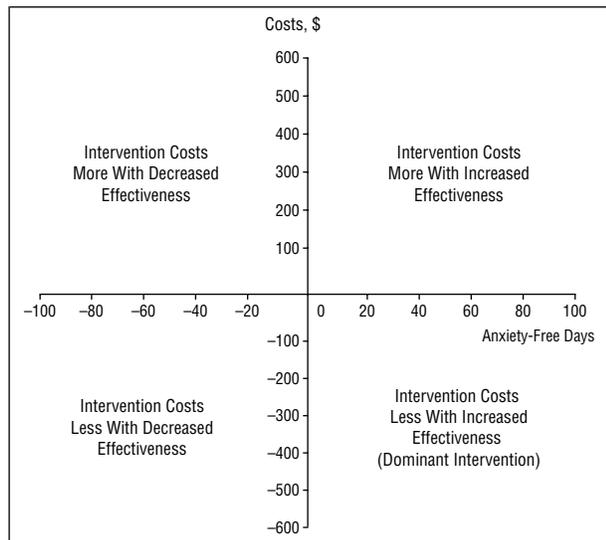
Statistical analyses were performed using Stata (version 6.0; Stata Corp, College Station, Tex) and SPSS software (version 10.0 for Windows; SPSS Inc, Chicago, Ill). Demographic data were compared using *t* tests for continuous measures and  $\chi^2$  analyses with correction for continuity for the dichotomous ones. Because of the skewed distributions of outpatient visits, we used nonparametric median tests to test for CC vs UC group differences. The cost distributions were positively skewed (many low costs and few higher costs), so the analyses of covariance between the groups on all cost measures were conducted using logarithm-transformed data with age, sex, clinic type, and comorbid medical illness (CIRS) as the covariates.

The cost-effectiveness of the CC intervention treatment program for panic disorder was evaluated from the payer or plan perspective. Incremental cost-effectiveness ratios (ICERs) were estimated. The numerator of the ICER, the incremental cost (the cost of intervention minus the cost of control treatment [CC-UC]), was estimated using the formulation by Blough et al<sup>31</sup> of the traditional 2-part model, in which part 1 estimates the probability of any cost and part 2 uses a gamma regression with a log link estimating the level of cost. This method was used because of the heteroscedasticity of our cost data and to avoid potential distortions that are due to transformation and retransformation of the data.<sup>31</sup> This method also allowed us to adjust for group differences in age, sex, clinic, and CIRS scores. The denominator of the ICER (AFDs in CC patients minus AFDs in UC patients), the measure of clinical effectiveness, was modeled using ordinary least squares regression adjusting for CIRS scores (medical comorbidity). We estimated 95% confidence intervals (CIs) for cost-effectiveness, clinical effectiveness, and the ICERs by means of bootstrapping procedures with 1000 replications and bias correction. Bootstrapping procedures use every patient's individual data to create an empirical sampling distribution of the test statistics for the population. These techniques provide less biased estimates of CIs in highly skewed cost data.<sup>30,32,33</sup>

For each of the 1000 ICERs, the difference in cost (CC-UC) is examined and compared with its corresponding difference in effectiveness (difference in AFDs for CC-UC). Dominance of the CC intervention is determined by examining the probability (of 1000 replications) that CC is more effective than UC (positive clinical effectiveness) and costs less than UC (negative incremental cost benefits; lower-right quadrant of the **Figure**). Dominance of the control (UC) group is determined by examining the probability (of 1000 replications) that UC is more effective than CC (negative clinical effectiveness) and that UC costs less than CC (positive incremental costs; upper-left quadrant of the **Figure**). We also calculated the probability that CC is more effective and more costly than UC (upper-right quadrant of the **Figure**), and that CC is less effective and less costly (lower-left quadrant of the **Figure**). These 4 probabilities are often portrayed as 4 quadrants in a cost-effectiveness-clinical effectiveness plane or graph, as shown in the **Figure**.

### RESULTS

Of 7875 patients (7765 encountered in the waiting room; 110 referrals), 3797 were eligible and 3035 agreed to undergo screening. Of the 479 (429 waiting-room encounters and 50 referrals) with positive responses on the brief 2-question panic disorder screen, 115 (71 waiting-room encounters and 44 referrals) were ultimately enrolled. Only 21 (5%) of 429 waiting room subjects with positive screening responses for panic disorder and who



Cost-effectiveness and clinical effectiveness of the intervention. The intervention consisted of acute-phase treatment in the primary care setting from a consulting psychiatrist and the primary care physician in the first 3 months, followed by a handoff to a primary care physician who continued to follow up the patient.

were qualified based on structured interview refused enrollment in the study.

A total of 57 patients were randomized to the UC group and 58 patients to the CC intervention group. An intent-to-treat sample (n=115) was used for all statistical analyses with the exception of the cost-effectiveness ratio, in which results were based on the 108 subjects with at least 2 ASI data points. **Table 1** presents the demographic variables for the 2 groups. The 2 groups were not statistically different in age, sex, ethnicity, employment, CIRS scores, or baseline ASI score.

The CC group had significantly more AFDs (mean, 230.6; 95% CI, 193.5-267.7) than the UC group (mean, 150.8; 95% CI, 113.0-188.6) ( $t_{113}=3.02$ ;  $P=.003$ ). The incremental number of AFDs attributable to the intervention was 74.2 (95% CI, 15.8-122.0). We found no significant differences in AFD outcomes for patients who underwent screening in the waiting in room vs those who were referred, and no statistically significant interactions of treatment and approach (waiting room vs referral) groups.

The data for the use of medical services can be seen in **Table 2**. The groups were not significantly different in the number of primary care visits or the total number of primary care and mental health visits. However, a significant difference was seen in the median total number of mental health visits. The CC group had a median of 3, compared with 0 for the UC group, which is interesting in light of the nearly identical mean values of the groups.

**Table 3** presents the raw cost data for the 12-month study. The 2 groups did not differ significantly in any of the cost breakdowns except for CC patients having significantly higher costs for psychiatric medications ( $F_{1,106}=6.46$ ;  $P=.01$ ) and total outpatient mental health costs, which includes psychiatric medications, mental health visits, and intervention visits ( $F_{1,106}=5.49$ ;  $P=.02$ ). Although the UC group appeared to have higher

**Table 1. Patient Characteristics\***

Characteristic	Patient Groups		$\chi^2$ or $t_{113}$
	CC (n = 57)	UC (n = 58)	
Female sex, No. (%)	29 (51)	37 (64)	1.47†
White, No. (%)	41 (72)	35 (60)	0.75†
Employed, No. (%)	36 (63)	37 (64)	0.01†
Age, mean (SD), y	39.6 (10.2)	41.9 (10.4)	1.24‡
CIRS score, mean (SD)	1.3 (0.7)	1.5 (0.5)	1.80‡
Baseline ASI score, mean (SD)	29.8 (12.0)	28.9 (12.3)	0.40‡

\*The collaborative care (CC) intervention is described in the "Eligibility for Randomization" subsection of the "Methods" section. UC indicates usual primary care; CIRS, Cumulative Illness Rating Scale; and ASI, Anxiety Sensitivity Inventory.

†By  $\chi^2$  test.

‡By  $t$  test ( $df = 113$ ).

**Table 2. Outpatient Visits During the 1-Year Study for CC vs UC Groups\***

	Patient Groups		Median Test†
	CC (n = 57)	UC (n = 58)	
Intervention visits			...
Mean (SD)	1.77 (0.94)	0	
Median (range)	2 (0-5)	...	
Other MH visits			0.01
Mean (SD)	3.54 (7.30)	5.6 (10.97)	
Median (range)	1 (0-47)	0 (0-48)	
Total MH visits			11.90‡
Mean (SD)	5.32 (7.47)	5.6 (10.97)	
Median (range)	3 (0-49)	0 (0-48)	
Primary care visits			1.72
Mean (SD)	7.70 (7.84)	10.39 (11.35)	
Median (range)	5 (0-37)	7 (0-57)	
Total primary care and MH			0.32
Mean (SD)	13.02 (12.68)	16.05 (16.87)	
Median (range)	11 (1-86)	13 (0-68)	

\*The collaborative care (CC) intervention is described in the "Eligibility for Randomization" subsection of the "Methods" section. UC indicates usual primary care; MH, mental health; and ellipses, not applicable.

†Determined by  $\chi^2$  with correction for continuity.

‡ $P = .001$ .

costs for non-mental health medications, medical testing, non-mental health primary care visits, total outpatient non-mental health services, and total outpatient services, the broad range of 95% CIs in each of these measures overlapped in the CC and UC groups.

**Table 4** displays adjusted incremental cost and adjusted ICERs for total mental health costs and total outpatient costs. For total mental health costs (our primary outcome), the cost-effectiveness ratio was \$3. The 95% CIs for incremental cost-effectiveness ranged from -\$2 per AFD (which reflects the lower bound for incremental cost and the upper bound for incremental treatment effectiveness) to \$11 (which reflects the upper bound for incremental cost and the lower bound for incremental effectiveness). Therefore, the intervention may have a small cost savings, neutral costs, or an increment of up

**Table 3. Health Services Costs During the 1-Year Study for CC vs UC Groups\***

Health Service, Cost	Patient Groups	
	CC (n = 57)	UC (n = 58)
Psychiatric medications†		
Mean (95% CI)	589 (455-722)	486 (306-665)
Median	629	210
MH visits		
Mean (95% CI)	147 (73-220)	236 (134-339)
Median	34	51
Intervention visits		
Mean (95% CI)	126 (110-142)	0
Median	144	0
Outpatient MH costs†		
Mean (95% CI)	862 (677-1047)	722 (502-942)
Median	874	481
Non-MH medications		
Mean (95% CI)	632 (245-1018)	1400 (446-2353)
Median	53	168
Diagnostic tests		
Mean (95% CI)	276 (164-389)	480 (317-643)
Median	112	182
Non-MH primary care visits		
Mean (95% CI)	335 (247-423)	481 (338-623)
Median	211	293
Total outpatient non-MH		
Mean (95% CI)	1243 (779-1706)	2385 (1225-3545)
Median	545	959
Total outpatient		
Mean (95% CI)	2104 (1587-2622)	3118 (1858-4377)
Median	1562	1863
Inpatient		
Mean (95% CI)	784 (165-1403)	1069 (0-2233)
Median	0	0
Total 1-year health service costs		
Mean (95% CI)	2888 (2044-3733)	4205 (2362-6048)
Median	1692	1863

\*The collaborative care (CC) intervention is described in the "Eligibility for Randomization" subsection of the "Methods" section. UC indicates usual primary care; CI, confidence interval; and MH, mental health.

†Costs for the CC group were significantly greater than those for the UC group ( $P < .05$ ).

to \$11 per AFD. In 1000 bootstrap replications, dominance (less costly and more effective) of the CC intervention was observed 97 times, whereas the dominance of UC was observed only 4 times. The rest of the 899 replications found that the CC intervention had greater costs but was more effective than UC.

For total outpatient costs, we found a cost savings of \$4 per AFD, with a 95% CI ranging from an offset of -\$23 to a cost of \$14. Therefore, we cannot exclude a cost savings per AFD, neutral costs, or an increment of \$8 per AFD. In 1000 bootstrap replications, dominance of the CC intervention for total outpatient costs was observed 699 times (less costly and more effective), whereas dominance of UC was not observed. Twice CC was found to be more costly and less effective, and twice CC was found to be less costly and less effective. The rest of the 297 replications found that CC cost more and was more effective than UC.

**Table 4. Incremental Cost-effectiveness of the CC Intervention\***

	Incremental Cost (95% CI)	Cost per Additional Anxiety-Free Day (95% CI)
Total outpatient MH costs†	205 (-135 to 501)	3 (-2 to 11)
Total outpatient costs‡	-325 (-1460 to 448)	-4 (-23 to 14)

\*Data are given in dollars. The collaborative care (CC) intervention is described in the "Eligibility for Randomization" subsection of the "Methods" section. Adjustment for medical comorbidity, age, sex, and clinic are included. CI indicates confidence interval; MH, mental health.

†Includes psychiatric medications, intervention visits, and MH visits.

‡Includes total outpatient MH costs and total non-MH outpatient costs.

Because much of the incremental mental health costs associated with the CC intervention were the costs of SSRIs, and because the cost of these medications is likely to decrease significantly with the availability of nonpatented fluoxetine hydrochloride, we performed a sensitivity analysis for total mental health costs with SSRIs at half of their current costs. This sensitivity analysis found that incremental mental health costs decreased to \$130 (95% CI, -\$116 to \$329), and that the mental health costs per AFD decreased to \$1.74 (95% CI, -\$2 to \$8).

#### COMMENT

In primary care patients with panic disorder, the CC intervention significantly increased the number of AFDs during a 1-year study, with 74.2 incremental AFDs attributed to the intervention. The ICER using total outpatient costs suggests a 0.70 probability that CC is a dominant intervention (costs less and is more effective) in primary care patients with panic disorder. This finding is demonstrated by 699 of the 1000 bootstrap replications of the estimates falling into the lower right quadrant of the Figure, and it suggests that even if payers are not willing to add any costs to improve mental health outcomes, there is an approximately 0.70 probability that CC interventions will cost less with enhanced outcomes for patients with panic disorder. However, 297 of the 1000 bootstrap replications of the ICER estimates showed that the CC intervention has greater total outpatient costs with more effectiveness, which suggests a nontrivial likelihood that the CC intervention is more costly but more effective.

For total mental health costs, an approximately 0.90 probability that the CC intervention was more costly and more effective is not surprising. The main goal of the intervention was to increase the use of adequate dosages of SSRIs during a 1-year period by integrating approximately 2 psychiatric visits into the acute phase of pharmacological treatment of primary care patients with panic disorder. We have demonstrated in our main outcome report that this goal to enhance pharmacotherapy in intervention vs control patients was met,<sup>11</sup> and Table 3 demonstrates the higher costs for psychiatric medications and intervention visits in intervention patients. Our sensitivity analysis demonstrates that the mental health costs per AFD associated with the CC intervention will decrease as the costs of SSRIs decrease.

The higher likelihood of the CC intervention being dominant (0.70 probability) when taking into account all outpatient costs vs the lower probability of CC being dominant (0.10 probability) when only mental health costs were considered in the incremental cost-effectiveness ratios suggests a high likelihood of a medical cost offset associated with the CC intervention. Table 3 shows nonsignificant increases in costs of non-mental health medication, medical testing, non-mental health primary care visits, and total outpatient non-mental health services in the UC group, even when controlling for medical comorbidity. In each cost variable, the trends were for increased costs in UC patients compared with controls.

Previous cost-effectiveness studies of CC interventions for primary care patients with major depression differ from the results found in this study of patients with panic disorder. The previous depression studies have all shown that CC interventions with psychiatrists or psychologists have been more costly and more effective (upper right quadrant of the Figure), whereas none suggested a high probability of a medical cost offset.<sup>12,13,34</sup> Untreated or partially treated patients with panic disorder may be especially likely to have patterns of high use of health care services and to receive costly medical testing because of frightening medically unexplained symptoms.<sup>35</sup> Previous studies have shown that patients with chest pain and negative angiographic findings,<sup>4</sup> palpitations,<sup>36</sup> gastrointestinal tract symptoms with negative findings of workups that included upper and lower endoscopy,<sup>37</sup> labile hypertension with negative findings of pheochromocytoma testing,<sup>38</sup> and dizziness with negative findings of otolaryngological testing<sup>39</sup> have a higher prevalence of panic disorder than controls.

Several limitations should be considered in interpreting our findings. We did not consider the effect of anxiety or of treatment of anxiety from broader perspectives such as that of the employer (eg, absences and lost productivity) or of the larger society (eg, effects on earning potential and marital stability). Had the indirect costs been included, the CC intervention probably would be considered to have even higher value. Multiple studies have demonstrated that panic disorder is associated with decrements in work, social, and familial roles.<sup>9,40-43</sup> A longitudinal study showed that panic disorder was associated with a 5-fold higher risk for receiving new disability payments during a 1-year period,<sup>8</sup> and a recent intervention study found that effective treatment of panic disorder was associated with higher medical costs but marked savings in indirect costs from earnings due to increased work productivity.<sup>44</sup> Our data from this trial demonstrated that CC was associated with significantly greater improvements in role functioning.<sup>11</sup>

Another limitation was that we did not directly measure patients' time off of work to attend physician visits in this study (travel time to and from the clinic, waiting time in the clinic, and time with the physician). We provide the following estimates of differences in costs for patient time between intervention and control subjects to account for these indirect costs borne by patients. Based on a recent study, we estimated 30-minute visits with primary care physicians and 45-minute visits with a men-

tal health specialist, 1-hour travel to and from the clinic, and a 45-minute wait in the clinic.<sup>45</sup> We used a median hourly wage of \$12 based on the hourly salaries of study patients who were working and a minimum state wage of \$7 per hour for unemployed patients. Our estimates based on these parameters suggest that indirect patient time costs for working patients would be a mean of \$367 for CC vs \$450 for UC patients. For unemployed patients, the mean cost would be \$214 for CC and \$262 for UC. These estimates suggest additional cost savings of approximately \$48 to \$83 per patient associated with the CC intervention when using a perspective that takes into account indirect costs borne by the patient.

## CONCLUSIONS

A CC intervention was associated with 74.2 more AFDs over a 1-year period compared with UC. No significant differences were seen between CC and UC in total outpatient costs, and the distribution of the cost-effectiveness ratio based on total outpatient costs suggests a 70% probability that the CC intervention was dominant compared with UC (ie, lower costs with greater effectiveness).

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