Original Research

Improving Care for Depression in Obstetrics and Gynecology

A Randomized Controlled Trial

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OBJECTIVE: To evaluate an evidence-based collaborative depression care intervention adapted to obstetrics and gynecology clinics compared with usual care.

METHODS: A two-site, randomized controlled trial included screen-positive women (Patient Health Questionnaire-9 score of at least 10) who met criteria for major depression, dysthymia, or both (Mini-International Neuropsychiatric Interview). Women were randomized to 12 months of collaborative depression management or usual care; 6-month, 12-month, and 18-month outcomes were compared. The primary outcomes were change from baseline to 12 months in depression symptoms and functional status. Secondary outcomes included at least 50% decrease and remission in depressive symptoms, global improvement, treatment satisfaction, and quality of care.

RESULTS: Participants were, on average, 39 years old, 44% were nonwhite, and 56% had posttraumatic stress disorder. Intervention (n=102) compared with usual care (n=103) patients had greater improvement in depressive symptoms at 12 months ($P<.001$) and 18 months ($P=.004$). The intervention group compared with usual care group had improved functioning over the course of 18 months ($P<.05$), were more likely to have at least 50% decrease in depressive symptoms at 12 months (relative risk [RR] 1.74, 95% confidence interval [CI] 1.11–2.73), greater likelihood of at least four specialty mental health visits (6-month RR 2.70, 95% CI 1.73–4.20; 12-month RR 2.53, 95% CI 1.63–3.94), adequate dose of antidepressant (6-month RR 1.64, 95% CI 1.03–2.60; 12-month RR 1.71, 95% CI 1.08–2.73), and greater satisfaction with care (6-month RR 1.70, 95% CI 1.19–2.44; 12-month RR 2.26, 95% CI 1.52–3.36).

CONCLUSION: Collaborative depression care adapted to women's health settings improved depressive and functional outcomes and quality of depression care.

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LEVEL OF EVIDENCE: I

Major depression disproportionately affects women, with a lifetime prevalence of 21%[1] and a female-to-male ratio of approximately 2:1.[2] Major depressive episodes occur throughout a woman's lifespan, with highest rates occurring during the reproductive and menopausal transition years.[3] Obstetrician–gynecologists (ob-gyns) are often the only health care providers with whom many women regularly schedule appointments. One-third of all visits for women aged 18 to 45 years and the majority of nonillness-related visits for women younger than age 65 years are provided by ob-gyns.[4] Ob-gyns estimate that 37% of their nonpregnant patients rely solely on them for routine care.[5] Disadvantaged poor and minority women have the

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highest prevalence of depression and are more likely to seek routine care in gynecology rather than primary care settings.[6]

Collaborative care models that integrate depression care into primary care clinics show improvement in quality of mental health care and depression outcomes.[7] Few studies have evaluated the adaptation of depression treatment models to obstetrics and gynecology settings.[8] Although ob-gyns acknowledge the need for depression management, they perceive significant barriers for screening and treating depression, including inadequate training and lack of resources for follow-up care.[9] Research documents marked gaps in diagnosis and quality of depression treatment in obstetrics and gynecology settings[10] greater than those observed for primary care.[11,12]

We conducted a randomized controlled trial in two obstetrics and gynecology clinics evaluating a 12-month collaborative depression care intervention. We hypothesized that patients assigned to the Depression Attention for Women Now study intervention would have improved depression treatment and functional outcomes, improved quality of care, and greater satisfaction with care compared with patients assigned to usual care.

MATERIALS AND METHODS

A multisite, randomized controlled trial with blinded assessment was designed to evaluate a collaborative care program for depression treatment in obstetrics and gynecology clinics. Women were randomized to a 12-month study intervention compared with usual care and had 6-month, 12-month, and 18-month follow-up visits. Before randomization, the study team provided a depression management educational session for the health care providers, staff, and managers at the study clinics. The University of Washington Institutional Review Board approved the study, all participants gave written consent, and safety was evaluated by a Data Safety and Monitoring Board. Study interventions and methods are described elsewhere in detail.[13]

Participants were recruited from November 2009 through December 2011 at two academic urban obstetrics and gynecology clinics with the following different patient populations: 1) underserved, racially diverse, ethnically diverse and largely uninsured; and 2) mixed socioeconomic backgrounds and largely insured Both clinic sites were staffed by attending and resident ob-gyn physicians and advanced registered nurse practitioners.

During recruitment, clinic receptionists provided a one-page document explaining study goals and potential participant roles to all patients at check-in. The research assistant then approached patients waiting for their health care providers and obtained verbal consent for study screening. Consenting participants were screened for depression with the Patient Health Questionnaire-9[11,14] before or after seeing their health care provider.

Screen-positive women (Patient Health Questionnaire-9 score of at least 10) were eligible if they met the criteria for major depression, dysthymia, or both after a structured psychiatric interview (Mini-International Neuropsychiatric Interview[15]), were English-speaking, had telephone access, and were at least 18 years old. Exclusions included homelessness, alcohol or drug misuse (previous 3 months), high suicide risk, at least one previous suicide attempt, bipolar or schizophrenic disorders, current severe domestic violence, or currently under the care of a psychiatrist. Women using antidepressants or other psychoactive medications or those receiving psychotherapy from nonpsychiatrist practitioners were eligible. All eligible, interested women were scheduled for an in-person baseline assessment, including informed consent and randomization.

Women were block-randomized via computer off-site (stratified by clinic site; pregnant compared with nonpregnant) to depression care management or usual care. We used random blocks with sizes two and four (alternated randomly) for pregnant women and random blocks with sizes four and six (alternated randomly) for nonpregnant women.

Collaborative care models integrate a team of mental health specialists to aid site clinicians in patient depression management.[7] Allied health specialists, such as nurse care managers, or social workers are used to enhance depression interventions and serve as depression care managers. Depression care managers provide evidence-based psychotherapy and track patient treatment responses, medications, and compliance. Collaborative care models include team management, tracking systems, and weekly structured case reviews with a psychiatrist, depression care manager, and site clinician.

The Depression Attention for Women Now intervention included an initial engagement session, proactive outreach for women missing sessions, choice of initial treatment, visits via telephone, and social workers as depression care managers to address social barriers to treatment. Women randomized to the intervention had an initial engagement session with a depression care manager designed to provide education about depression, elicit health concerns and barriers to treatment, and enhance participation in depression treatment.[16] During the subsequent session, depression care managers obtained clinical history, reviewed educational materials, and described

and discussed patient preferences for initiating treatment with either antidepressant medication or problem-solving treatment–primary care.[17,18] Depression care managers also supported women with social interventions (eg, financial assistance with medications or housing). All women received written depression educational materials.[19,20]

Problem-solving treatment–primary care, delivered by the depression care managers, has been proven to be as effective as antidepressants for primary care patients with major depressive disorder.[17] Problem-solving treatment–primary care was designed to attenuate depressive symptoms by assisting patients in the development of skills to alleviate life events stresses or problems.[18] Antidepressant medications (usually a selective serotonin reuptake inhibitor) were chosen using a clinical algorithm that incorporated the patient's current medication use in addition to past response to antidepressants. All intervention patients were coached to increase positive activities (eg, exercise, visiting a friend) that they had stopped because of depression.[21]

Depression care managers followed-up patients every 1 to 2 weeks (in-person or by telephone) for up to 12 months and monitored treatment response with the Patient Health Questionnaire-9 using a Microsoft Excel–based tracking system. Medication and behavioral therapy recommendations were made at weekly team meetings attended by the depression care manager and physician consultants (psychiatrist and ob-gyn). Recommended medication changes were communicated by the depression care manager to the patient's prescribing ob-gyn provider. Participants were monitored monthly for symptoms after a clinical response (decrease of 50% or more in Patient Health Questionnaire-9 score from baseline), remission (Patient Health Questionnaire-9 score less than 5), or both.

Women with less than 50% improvement in depressive symptoms by 4 to 8 weeks received a revised treatment plan. Women using medication alone could receive an increased dosage or switch to a different medication, with or without augmentation with problem-solving treatment–primary care. Women receiving problem-solving treatment–primary care could be augmented with, or switched to, a trial of antidepressant medication. Women with persistent symptoms despite collaborative care management were referred for specialty mental health treatment.

Depression care managers received 1 week of training that included problem-solving treatment–primary care instruction, a standardized depression care manager treatment manual,[18] and training specific to women's health (eg, sexual assault, infertility, and domestic violence). Each depression care manager audio-recorded an introductory session and at least one problem-solving treatment–primary care session with a practice patient before being certified as competent in the treatment model. In addition, at least one audio-recorded study participant session per depression care manager was reviewed by the psychologist (E.L.) for quality assurance using fidelity rating forms.[18] Intervention fidelity feedback was given during weekly supervision to minimize intervention drift.

Women randomized to usual care were informed of their diagnosis by the research assistant and received a depression educational booklet.[19] All patients had the opportunity for referral to social work and psychiatric consultations. They were asked for consent to notify their health care provider of their depression diagnosis. Women with mild to moderate depression were encouraged to make a follow-up appointment with their ob-gyns, and women with severe depression were triaged for immediate care.

Baseline data were collected by research assistants screening patients in each clinic. Outcomes were measured at 6, 12, and 18 months using standardized questionnaires and were collected by telephone by a research assistant blinded to intervention status. Each follow-up period was defined as up to 2 weeks before and 16 weeks after the assigned time point. The primary outcomes were changed from baseline to 12 months on the Hopkins Symptom Checklist-20[22] and functional status was recorded on the Sheehan Disability Scale.[23] Secondary outcomes included treatment response (at least 50% reduction in Hopkins Symptom Checklist-20 score from baseline), complete remission of depressive symptoms (Hopkins Symptom Checklist-20 score less than 0.5),[22] Patient Global Improvement,[24] and satisfaction with depression care.[25–27] Quality of mental health care was assessed with standardized questions about antidepressant medication use (adequate dose defined as recommended starting dose on package insert, eg, 20 mg fluoxetine), counseling frequency during each 6-month period,[26–28] and estimated intervention treatment costs per our previously described model[29] (Appendix).

Demographic information included age, education, marital status, race or ethnicity, and insurance. Additional information was gathered using specific validated questionnaires for factors that could potentially confound results, such as currently pregnant, hormone use, medical comorbidity (Depression Partners in Care, an Agency for Healthcare Research and Quality Patient Outcomes Research Team [PORT-II] Comorbidity Scale),[30] current panic disorder (Mini-International Neuropsychiatric Interview 5.0.0 Panic Module),[15] and posttraumatic stress disorder (PTSD) 17-item PTSD Checklist–civilian version.[31] We used a Posttraumatic Stress Disorder

Checklist–civilian version score of 45 or more, which has the highest sensitivity and specificity for PTSD based on structured psychiatric interview.[31]

We estimated 118 participants were required in each group (N=236) to have an 80% chance (with a two-sided 5% significance level) of detecting an effect size of 0.57[25] in the mean Hopkins Symptom Checklist-20 score.[22] We estimated that a sample of 130 women per group (260 women) would have 69% power (with a two-sided 5% significance level) of detecting an effect size of 0.26 in the mean Sheehan Disability Score.[32] These calculations allowed for correlations between 0.3 and 0.5 for our primary outcome across time and attrition up to 25%.

Analyses were conducted according to the intention-to-treat principle. Descriptive statistics were generated for all variables. The χ^2 tests of proportions, relative risks, and 95% confidence intervals were used to determine group differences on the dichotomous satisfaction, quality of care, and depression response variables at each time point. Generalized estimating equation models allowing for inclusion of all available data in the estimates of the model parameters examined treatment group trends over time. Robust standard errors were estimated.[33] A statistically significant treatment group-by-time interaction indicated differences in trends over time for the two groups. In the event of a nonsignificant interaction, the term was removed and the model was re-fit; the main effects of time and group were then examined. We calculated the effect size for improvement in depressive outcomes at 12 months based on Hopkins Symptom Checklist-20 to compare our results with previous primary care meta-analyses of collaborative care trials.[7] Number needed to treat was calculated based on differences between the intervention group compared with the usual care group in the percent of patients with a 50% or greater response to treatment at 12 months. Clinic site was examined as a moderator in our models by testing clinic site as a three-way interaction with group and time.

RESULTS

Of 6,875 patients who agreed to screening, 6,462 (94%) completed screening; 1,019 (16%) had screening results positive for major depression based on the Patient Health Questionnaire-9 and 650 (64%) agreed to further eligibility screening (Fig. 1). Of the 650, 445 were excluded and 205 (31%) were randomized. Of those randomized (102 intervention, 103 usual care), follow-ups were completed at 6 months (89%), 12 months (88%), and 18 months (83%).

There were no baseline differences between groups (Table 1). Participants were, on average, 39 years old (range, 20–69 years), 48% were married or living with a partner, 40% had commercial health insurance, and 44% were nonwhite. Ninety-nine percent of patients met criteria for major depression, 33% met criteria for dysthymia, and 56% had PTSD.[31]

Most women in the intervention group (96%) had at least one depression care manager visit. Intervention patients had a mean of 9.6 (standard deviation 7.1) in-person visits and 6.4 (standard deviation 6.0) telephone visits. Fifty-five women (53.9%) were treated with antidepressant medication and problem-solving treatment–primary care, 32 (31.4%) were treated with problem-solving treatment–primary care alone, 12 (11.8%) were treated with antidepressants alone, and 4 (3.9%) elected not to receive either treatment. The estimated cost per patient, including all depression care manager contacts, physician supervision, and information system support was $1,026 (Appendix).

At 6 months, the reduction in depression symptom scores from baseline was similar, but at 12 months ($P<.001$) and 18 months ($P=.004$) the intervention group demonstrated greater depression score decreases than did the usual care group (Table 2, Fig. 2). The model using baseline, 6-month, 12-month, and 18-month follow-up Hopkins Symptom Checklist-20 continuous data showed a group-by-time interaction (Wald $\chi^2=28.36$, degrees of freedom=3; $P<.001$). The effect size for improvement in depressive outcomes based on the Hopkins Symptom Checklist-20 was 0.63 at 12 months.

The model for functional status improvement over the four assessments demonstrated a group-by-time interaction (Wald $\chi^2=7.82$, degrees of freedom=3; $P=.050$) (Table 2). At 12 months and 18 months the average functional improvement was greater for the intervention group, but these differences were not significant.

The proportion of intervention patients with a depression treatment response (at least 50% decrease in Hopkins Symptom Checklist-20 scores from baseline) at 12 months ($P=.015$) was greater than that for usual care, with a group-by-time effect (Wald $\chi^2=6.52$, degrees of freedom=2; $P=.031$) (Table 3) and number needed to treat of 4 (95% confidence interval 3–10). Depression remission rates were higher in the intervention group compared with the usual care group at 18 months ($P=.045$), but not at 6 months ($P=.655$) or 12 months ($P=.195$). The model for remission had a nonsignificant treatment group-by-time interaction (Wald $\chi^2=4.68$, degrees of freedom=2; $P=.096$). The main effect model showed a time effect (Wald $\chi^2=8.77$, degrees of freedom=2; $P=.012$) and a nonsignificant treatment effect (Wald $\chi^2=2.44$, degrees of freedom=1; $P=.118$).

A greater percentage of intervention group participants compared with usual care participants

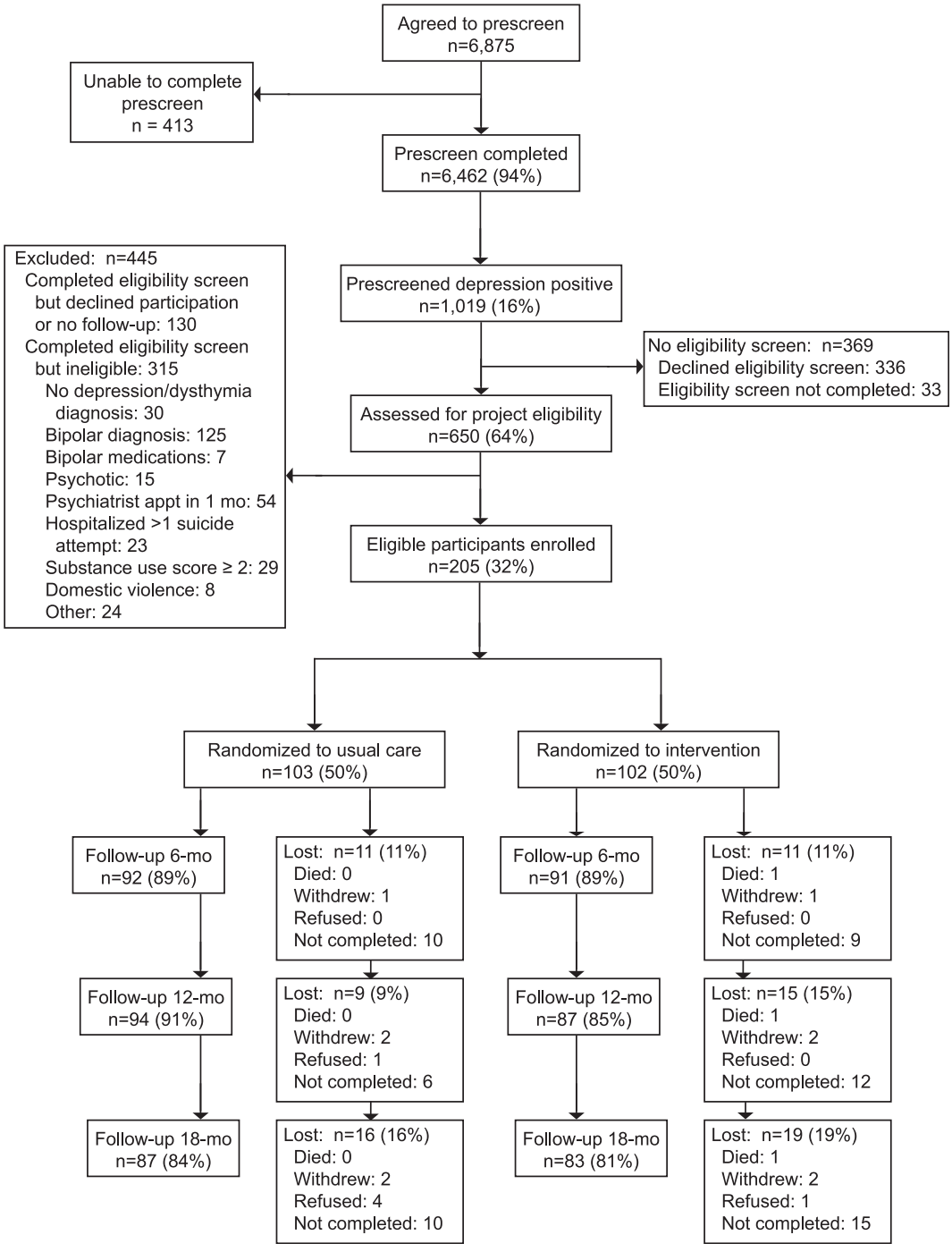

Fig. 1. CONSORT flow diagram. "Lost" (no follow-up) categories: "refused" and "not completed" may have varied by time points; however, "withdrew" and "death" were cumulative. "Other" included homeless or moving (n=12), participating in other research study (n=4), non-English-speaking (n=3), medical illness (n=3), and changing health care provider (n=2).
Melville. Collaborative Care Model for Depression. Obstet Gynecol 2014.

rated themselves as "much or very much improved" on the Patient Global Improvement scale at each time point (6 months, P=.032; 12 months, P<.001; 18 months, P=.005) (Table 3). The treatment group-by-time interaction was not significant (Wald χ^2=5.52, degrees of freedom=2; P=.063), but the treatment (Wald χ^2=26.15, degrees of freedom=2; P<.001) and time effects (Wald χ^2=10.11, degrees

Table 1. Baseline Patient Characteristics

Variable	Intervention (n=102)	Usual Care (n=103)	*P*
Age (y)	39.5±12.1	38.6±12.1	.606
Education, at least some college	85.3 (87)	85.4 (88)	1.000
Married or living with significant other	50.0 (51)	46.6 (48)	.676
Race			
White	59.4 (60)	54.4 (54)	
African American	19.8 (20)	21.4 (22)	
Asian-Pacific Islander	8.9 (9)	8.7 (9)	.916
Hispanic	5.0 (5)	9.7 (10)	
Native American	6.9 (7)	5.8 (6)	
Insurance			
None	32.4 (33)	29.1 (30)	
Medicaid or State	23.6 (24)	20.4 (21)	
Medicare	4.9 (5)	6.8 (7)	.722
Private	39.1 (40)	43.7 (45)	
No. of chronic conditions (PORT comorbidity scale)	1.9±1.8	1.9±1.6	.839
Pregnant, current	7.8 (8)	6.9 (7)	1.000
Currently using hormones	15.7 (14)	9.2 (8)	.255
Major depression diagnosis (MINI), current	98.0 (100)	99.0 (102)	.621
Dysthymia diagnosis (MINI), current	33.3 (34)	34.3 (35)	1.000
Recurrent depression (2 or more episodes)	74.5 (76)	69.9 (72)	.171
SCL-20 depression score	2.05±0.61	1.96±0.62	.300
PHQ-9 depression score	16.4±4.1	15.9±4.0	.388
Age at first depression episode	21.3±10.3	22.0±12.2	.675
SDS functional impairment score	6.20±2.38	6.04±2.31	.646
Panic disorder (MINI 5.0 Panic Module), current	10.8 (11)	5.8 (6)	.217
PTSD (PCL-C score 45 or more), current	53.9 (55)	56.3 (59)	.780
PTSD PCL-C score	47.1±12.2	46.0±12.1	.507

PORT Depression comorbidity scale (range, 0–19)[29]; MINI, Mini-International Neuropsychiatric Interview diagnosis by structured interview[15]; SCL-20, Hopkins Symptom Checklist-20 (range, 0–4)[22]; PHQ-9, Patient Health Questionnaire-9 (range, 0–27)[11,14]; SDS, Sheehan Disability Scale (range, 0–10)[23]; PTSD, posttraumatic stress disorder; PCL-C, PTSD Checklist–civilian (range, 17–85; more than 45=cut-off for PTSD)[30].

Data are mean±standard deviation or % (n) unless otherwise specified.

of freedom=1; *P*=.006) were significant. Intervention group participants reported greater satisfaction with depression care than usual care group participants at 6 months (89.0% compared with 52.2%; *P*=.004) and 12 months (89.5% compared with 39.6%; *P*<.001).

Quality of care outcomes included number of mental health visits and antidepressant use and adherence (Table 4). Women receiving the intervention were more likely to have had at least four mental health visits (including depression care manager visits) during the first 6 months (79.1% compared with 29.3%; *P*<.001) and the second 6 months (74.9% compared with 30.8%; *P*<.001). At baseline, the groups did not differ in self-reported antidepressant use, but at 6 months and 12 months the intervention group showed nonsignificant higher rates of antidepressant use than did the usual care group (Wald χ^2=4.19, degrees of freedom=2; *P*=.120). Re-fitting the model showed no significant main effects of time or treatment group. Intervention women had higher rates of using at least two antidepressants simultaneously at both 6 months and at 12 months, with a group-by-time interaction (Wald χ^2=8.22, degrees of freedom=2; *P*=.013).

The model for antidepressant adherence (using an antidepressant for at least 25 of the previous 30 days) showed greater adherence in the intervention group compared with usual care group, although this difference was not statistically significant (Wald χ^2=4.14, degrees of freedom=2; *P*=.123) (Table 4). Re-fitting the model showed that time (Wald χ^2=30.90, degrees of freedom=2; *P*<.001) and treatment group (Wald χ^2=7.25, degrees of freedom=1; *P*=.007) effects were significant, indicating greater antidepressant adherence in the intervention group at 6 months and 12 months compared with the usual care group. Intervention group participants compared with usual care group participants had higher rates of using an antidepressant for at least 3 months during each 6-month period at a minimally adequate dosage, with a significant

Table 2. Intervention Compared With Usual Care Differences in Primary Clinical Outcomes

Primary Outcomes	Total No. of Patients	Continuous Outcomes			
		Intervention	Usual Care	Average Differences Between Groups (Intervention–Usual Care) Mean (95% CI)	*P*
Decrease in depression score (SCL-20) from baseline					<.001*
6 mo	183	0.72±0.77	0.69±0.76	0.03 (−0.25 to 0.19)	.779
12 mo	181	1.10±0.74	0.62±0.78	0.48 (−0.70 to −0.25)	<.001
18 mo	170	1.06±0.74	0.70±0.81	0.36 (−0.60 to −0.12)	.004
Decrease in functional impairment score (SDS) from baseline					<.050*
6 mo	183	1.58±3.28	2.14±2.60	−0.56 (−0.30 to 1.43)	.200
12 mo	180	2.56±3.10	1.95±2.67	0.62 (−1.46 to 0.23)	.154
18 mo	169	2.56±3.25	2.08±3.36	0.47 (−1.48 to 0.42)	.354

Data are mean±standard deviation unless otherwise specified. CI, confidence interval; SCL-20, Hopkins Symptom Checklist-20 (range 0–4); SDS, Sheehan disability Scale (range, 0–10).

* Group-by-time interaction: baseline to 18 months.

Measurement instrument from Derogatis LR, Lipman RS, Rickels K, Uhlenhuth EH, Covi L. The Hopkins Symptom Checklist (HSCL). A measure of primary symptom dimensions. Mod Probl Pharmacopsychiatry 1974;7:79–110 *and* Sheehan DV, Harnett-Sheehan K, Raj BA. The measurement of disability. Int Clin Psychopharmacol 1996;11(suppl 3):89–95.

time-by-group interaction (Wald χ^2=7.69, degrees of freedom=2; *P*=.021).

Clinic type was not found to be a moderating factor for any of the clinical outcomes. No three-way, two-way, or main effects of clinic were observed.

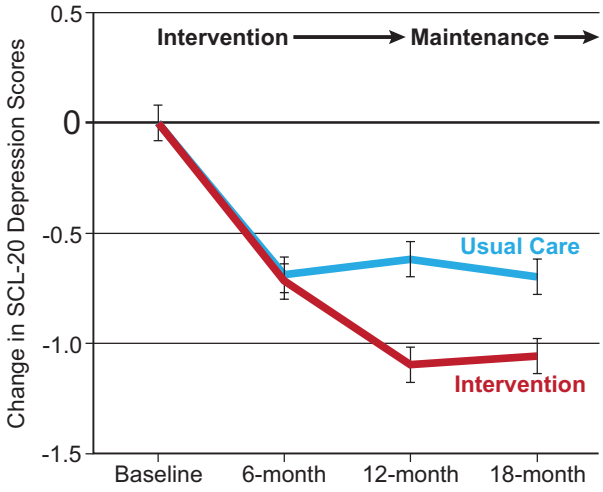

Fig. 2. Mean change in depressive symptoms by study group. The model-based estimates of the mean difference (standard error) in changes in depressive symptoms between the two groups (the change in the intervention group minus the change in the usual care or control group) at 6 months, 12 months, and 18 months on the Hopkins Symptom Checklist-20 (SCL-20) (range, 0–4). Measurement instrument from Derogatis LR, Lipman RS, Rickels K, Uhlenhuth EH, Covi L. The Hopkins Symptom Checklist (HSCL). A measure of primary symptom dimensions. Mod Probl Pharmacopsychiatry 1974;7:79–110.

Melville. Collaborative Care Model for Depression. Obstet Gynecol 2014.

Over the course of the 18-month trial, one usual care patient had a psychiatrically related emergency department visit, and one intervention group patient underwent psychiatric hospitalization.

DISCUSSION

The Depression Attention for Women Now intervention improved depression symptom and functional outcomes, adherence to evidence-based depression therapies, and overall treatment satisfaction in women, as compared with usual care. This depression intervention tailored for women was well-accepted and feasible to provide in the obstetrics and gynecology setting, even in clinics with high rates of poverty, PTSD, and complex social challenges. These findings are noteworthy because obstetrics and gynecology clinics are the sole or primary source of health care for more than one-third of women, including many underserved women who are at high risk for depression.[3]

The improved outcomes observed in our study of depression care customized for women's health care settings compare favorably with those observed in primary care clinics. In a recent meta-analysis, collaborative care was associated with significant improvement in depressive symptoms compared with usual primary care for up to 2 years.[7] As in our study, collaborative care also increased the number of patients using guideline-supported medication, improved mental health–related quality of life, and improved patient satisfaction with care. Remarkably, the effect size for improvement in depressive outcomes in the

Table 3. Intervention Compared With Usual Care Differences in Secondary Clinical Outcomes

Secondary Outcomes	Total No. of Patients	Dichotomous Outcomes			
		Intervention	Usual Care	RR (95% CI)	*P*
Response (at least 50% decrease in depression score [SCL-20]) from baseline					.031*
6 mo	183	37.4 (34)	34.8 (32)	1.07 (0.66–1.74)	.771
12 mo	181	57.5 (50)	33.0 (31)	1.74 (1.11–2.73)	.015
18 mo	170	55.4 (46)	37.9 (33)	1.46 (0.93–2.28)	.096
Complete remission of depression Symptoms (SCL-20 score less than 0.5)					.096*
6 mo	183	8.8 (8)	10.9 (10)	0.81 (0.32–2.05)	.655
12 mo	181	20.7 (18)	12.8 (12)	1.62 (0.78–3.36)	.195
18 mo	170	26.5 (22)	12.6 (11)	2.10 (1.02–4.32)	.045
PGI, much or very much improved					<.001*
6 mo	183	54.9 (50)	33.7 (31)	1.63 (1.04–2.55)	.032
12 mo	181	77.0 (67)	37.2 (35)	2.07 (1.37–3.11)	<.001
18 mo	170	69.9 (58)	37.9 (33)	1.84 (1.20–2.82)	.005
Satisfaction with care received during the intervention period, moderately satisfied or very satisfied					
6 mo	181	89.0 (81)	52.2 (47)	1.70 (1.19–2.44)	.004
12 mo	177	89.5 (77)	39.6 (36)	2.26 (1.52–3.36)	<.001

Data are % (n) unless otherwise specified. RR, relative risk; CI, confidence interval; SCL-20, Hopkins Symptom Checklist-20 (range 0–4); PGI, Patient Global Improvement.

* Group-by-time interaction: baseline to 18 months.

Measurement instruments from Derogatis LR, Lipman RS, Rickels K, Uhlenhuth EH, Covi L. The Hopkins Symptom Checklist (HSCL). A measure of primary symptom dimensions. Mod Probl Pharmacopsychiatry 1974;7:79–110 *and* Guy W, National Institute of Mental Health (U.S.). Psychopharmacology research branch, early clinical drug evaluation program. ECDEU assessment manual for psychopharmacology. Rockville (MD): U. S. Dept. of Health, Education, and Welfare, Public Health Service, Alcohol, Drug Abuse, and Mental Health Administration, National Institute of Mental Health, Psychopharmacology Research Branch, Division of Extramural Research Programs; 1976.

Table 4. Intervention Compared With Usual Care Differences in Quality of Care

Variable	Total No. of Patients	Intervention	Usual Care	RR (95% CI)	*P*
4 or more specialty mental health visits in previous 6 mo					
6 mo	183	79.1 (72)	29.3 (27)	2.70 (1.73–4.20)	<.001
12 mo	177	74.9 (67)	30.8 (28)	2.53 (1.63–3.94)	<.001
Any antidepressant medication					.123*
Baseline	205	46.1 (47)	49.5 (51)	0.93 (0.63–1.38)	.722
6 mo	183	61.5 (56)	47.8 (44)	1.29 (0.87–1.91)	.211
12 mo	177	61.6 (53)	47.3 (43)	1.30 (0.87–1.95)	.196
Two or more simultaneous antidepressant medications					.013*
Baseline	199	3.0 (3)	7.1 (7)	0.42 (0.11–1.61)	.204
6 mo	183	24.2 (22)	9.8 (9)	2.47 (1.14–5.37)	.022
12 mo	177	22.1 (19)	7.7 (7)	2.87 (1.21–6.83)	.017
Any antidepressant for 25 d or more in the previous month					.126*
Baseline	176	23.1 (21)	18.8 (16)	1.23 (0.64–2.35)	.539
6 mo	182	56.0 (51)	31.9 (29)	1.76 (1.12–2.77)	.015
12 mo	177	52.3 (45)	33.0 (30)	1.59 (1.01–2.52)	.050
Any antidepressant for 3 of the previous 6 mo at an adequate dosage†					.021*
Baseline	177	14.3 (13)	16.3 (14)	0.88 (0.41–1.87)	.735
6 mo	183	51.6 (47)	31.5 (29)	1.64 (1.03–2.60)	.037
12 mo	168	57.1 (48)	33.3 (28)	1.71 (1.08–2.73)	.023

Data are % (n) unless otherwise specified. RR, relative risk; CI, confidence interval.

* Group-by-time interaction: baseline to 12 months.

† Adequate dosage is the recommended starting dosage on package insert (eg, 20 mg of fluoxetine).

current study was 0.63 at 12 months, which was approximately double that found in the primary care meta-analysis (0.34). The number needed to treat of 4 is similar to that found in a systematic review of antidepressant compared with placebo treatment in medical populations.[34] Notably, our usual care group had the opportunity for antidepressant therapy and mental health referral; therefore, the effectiveness of the Depression Attention for Women Now intervention is all the more impressive. The improvement seen in these obstetrics and gynecology settings is important because ob-gyns rate their confidence in treating depression and skills with counseling and antidepressant medication as less than that of internists or family physicians.[12]

The Depression Attention for Women Now study population was unique in that more than 50% of women had significant PTSD symptoms at baseline and more than 50% had low incomes. Both socioeconomic deprivation[35] and PTSD[36] are associated with a higher prevalence and persistence of depression. This may explain why we saw a delayed response to collaborative depression care. Most other collaborative care studies in higher socioeconomic populations have shown significant effects by 6 months,[26,27] whereas we found few differences between intervention group and usual care group patients at 6 months but found robust effects at 12 months and 18 months. For patients living in poverty, chronic stressors such as problems paying for medication and delays in receiving treatment[37] may adversely affect treatment success. For women with depression and PTSD, the increased severity of their comorbid mental illness and symptoms such as nightmares, flashbacks, and anxiety attacks makes them more complex to treat.[36] A full 12-month intervention that includes an initial engagement session, proactive outreach, and social service management may be needed in settings serving women with high poverty and comorbidities.

Strengths of our study included an intervention targeted to women, the randomized trial design, patient diversity, consistency of findings across sites, high rates of intervention adherence, and minimal missing data. Limitations occur with self-report of antidepressant use, although previous studies found high rates of agreement between self-reported antidepressant use and pharmacy database prescription data.[26–28] Health care providers were not blinded to treatment group. There could have been a spillover or dilution effect of the intervention because the same health care providers often had patients in both treatment groups; however, this would drive findings toward the null and the spillover effect is likely small given that the majority of the intervention depression care was delivered by a mental health team. Our study may not be generalizable to non-English-speaking populations or smaller fee-for-service obstetrics and gynecology practices. Finally, our sample size did not allow sufficient power to analyze intervention effect by age group or by pregnancy status.

In summary, an integrated, collaborative, stepped care model for women with depression receiving care in obstetrics and gynecology clinics is feasible and significantly more effective than usual care in improving quality of mental health care, depressive and functional outcomes, and satisfaction with depression care, and can be provided at modest cost (not dissimilar to that of a pelvic magnetic resonance imaging). Improving mental health care provision in women's health care settings has important implications for U.S. families and society as a whole, particularly with the anticipated changes in health care delivery.

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Appendix

Costs for intervention services provided by study staff, which included caseload supervision, were calculated using actual salary and fringe benefit rates plus a 30% overhead rate (eg, space, administrative support).[29] The resulting unit costs were $80 for each care manager visit (typically 30 minutes) and $31 for each telephone contact (typically 10–15 minutes). These estimates included the time required for outreach efforts and recordkeeping (eg, estimated 45 minutes of care manager time was allowed for these telephone contacts). Intervention costs also included a fixed $60 cost for each caseload supervision and information support.