### It is illegal to post this copyrighted PDF on any website. Managing Depression Among Homeless Mothers: Pilot Testing an Adapted Collaborative Care Intervention

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#### ABSTRACT

**Objective:** Although depression is common among homeless mothers, little progress has been made in testing treatment strategies for this group. We describe pilot test results of an adapted collaborative care model for homeless mothers with depression.

**Method:** We conducted a pilot intervention study of mothers screening positive for depression in 2 randomly selected shelter-based primary care clinics in New York over 18 months in 2010–2012. Study participants completed a psychosocial, health, and mental health assessment at baseline, 3 months, and 6 months.

Results: One-third of women screened positive for depression (123 of 328 women). Sixtyseven women (63.2% of the eligible sample) enrolled in the intervention. At 6 months, compared to usual-care women, intervention group women were more likely to be receiving depression treatment (40.0% vs 5.9%, P = .01) and antidepressant medication (73.3% vs 5.9%, P = .001, respectively) and had more primary care physician and care manager visits at both 3 months (74.3% vs 53.3%, P=.009 and 91.4% vs 26.7%, P < .001, respectively) and 6 months (46.7% vs 23.5%, P=.003 and 70% vs 17.7%, P=.001, respectively). More women in the intervention group compared to usualcare women reported ≥ 50% improvement in depression symptoms at 6 months (30% vs 5.9%, P = .07).

**Conclusions:** This pilot study found that implementing an adapted collaborative care intervention was feasible in a shelter-based primary care clinic and had promising results that require further testing.

*Trial Registration:* ClinicalTrials.gov identifier: NCT02723058

Prim Care Companion CNS Disord 2016;18(2):doi:10.4088/PCC.15m01907 © Copyright 2016 Physicians Postgraduate Press, Inc.

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<sup>b</sup>Care for the Homeless, New York, New York <sup>c</sup>Preventive and Behavioral Medicine, University of Massachusetts Medical School, Worcester \**Corresponding author:* Linda Weinreb, MD, Family Medicine and Community Health, University of Massachusetts Medical School, 55 Lake Ave North, Worcester, MA 01655 (Linda.Weinreb@umassmemorial.org). **H** omeless mothers are more vulnerable to major depressive disorder (MDD) than comparable groups of impoverished mothers, with rates in community studies approaching 50%.<sup>1-3</sup> While depression may not predispose poor mothers to homelessness, and in fact, may be a consequence of homelessness,<sup>4</sup> it can interfere with mothers' capacity to care for children and to successfully pursue education and employment. Depression may also contribute to difficulties in overcoming homelessness.<sup>5</sup> Although primary care offers an ideal venue to identify and manage depression among women who commonly fail to receive needed mental health services, we are unaware of rigorously tested primary care–based treatment strategies that address the needs of homeless mothers with depression.

Among homeless women with symptoms suggestive of depression, less than one-third received mental health services during the prior year,<sup>6</sup> reinforcing the need to identify and engage women in primary care. Additionally, homeless mothers with mental health issues report conflict between meeting the needs of their children and managing their own illnesses, which creates a barrier to treatment participation.<sup>7</sup> There is good evidence that women with mental health disorders seek care more commonly in primary care settings compared to specialty treatments.<sup>8,9</sup> Further, homeless mothers with depression often have trauma histories that are accompanied by physical health conditions, resulting in high levels of medical care utilization and increasing the likelihood that they can be identified in primary care settings.<sup>9</sup>

The collaborative care model offers an effective treatment approach for depression in primary care.<sup>10,11</sup> While tested with diverse patient populations, it has not been adapted for and tested with homeless mothers. In this article, we provide information on a sample of homeless mothers receiving primary care and report results on a pilot test and feasibility findings of a new intervention, the Integrated Care Model for Homeless Mothers (ICMHM), adapted from the collaborative care model to address unique aspects of care for homeless mothers who screened positive for depression during a shelter-based primary care visit.

### METHOD

#### **Study Setting and Recruitment**

The study was conducted at 2 randomly selected and then assigned (one to intervention and one to usual care) primary care clinics based in family residence shelters in Queens and Bronx, New York (ClinicalTrials.gov identifier: NCT02723058). The design took advantage of the way in which homeless families were assigned on a rotating basis from a central registry to shelters in New York City, which controlled for possible bias in populations among different shelters.

All women entering the 2 shelters over 18 months in 2010–2012 were targeted for screening using the 9-item Patient Health Questionnaire (PHQ-9).<sup>12,13</sup> Shelter policies required new shelter residents to visit the primary care clinic to review basic health information. The vast majority of women complied, and at least 90% also received the depression screening questionnaire. Women who screened positive for possible MDD (score  $\geq 10$  on the PHQ-9) and who met criteria for the intervention study (aged  $\geq 18$  years, not pregnant, not

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anted PDF on any website. well as proactive, scheduled outreach to patients to monitor <u>llegal to post this copyr</u> lt ic

- Implementing a collaborative care model for depression in homeless shelter-based primary care clinics helps engage hard-to-reach and high-risk women in depression treatment by improving session completion and medication use.
- Without proactive outreach and regular monitoring, highrisk women will receive fewer treatment services.
- While multiple comorbidities and daily living stressors make it difficult for women to achieve positive clinical outcomes, this pilot model appears to help more women achieve clinically significant improvement.

currently receiving depression treatment, and not currently psychotic) were asked if they would be willing to talk to the research coordinator about study enrollment. The research coordinator made an appointment at the shelter within 1 week to explain the study. Whether or not they consented to study enrollment, any woman who screened positive for depression was provided an appointment with the primary care physician (PCP) and with the care manager to initiate depression treatment following the intervention model and to address any other health care needs. At the usualcare site, women who screened positive for depression also were provided appointments with the PCP who initiated treatment as usual, which could include antidepressant medication and recommendation for psychotherapy outside the clinic. Women in the usual-care group received general case management services that were available to all families receiving health services at the clinic. These services included, for example, assistance with obtaining public benefits, linking with community resources for family activities, outside mental health or substance use services, and meeting children's educational needs.

#### Intervention

The intervention consisted of a collaborative care model<sup>14,15</sup> modified to address the needs of homeless mothers. The collaborative care model principles of leadership engagement, proactive outreach by case managers, enhanced patient self-management, systems redesign, and use of clinical decision-making tools were incorporated into the intervention design. Leadership engagement involved training of the organization chief executive officer and clinical leaders, who provided commitment and support for universal depression screening and modification of PCP and existing case manager roles to implement the collaborative care model. The organization redesigned clinic systems at the intervention site (eg, implementation of universal screening processes) and made modifications to clinical decision tools (eg, adding fields and tracking capacity to the existing electronic medical record to be used to monitor depression symptom improvement). An existing case manager increased hours and was trained to become the depression care manager. The care manager was provided training and written materials to implement depression psychoeducation and facilitate patient goal setting and self-management, as

symptom change. Training was also provided to the PCP, including collaborating with the care manager to implement outreach, regular symptom monitoring, review of patient self-management, and treatment modifications. Further modifications of prior collaborative care model interventions included (1) incorporating a treatment engagement interview at the beginning of treatment conducted by the care manager, (2) having the care manager address basic needs (eg, obtaining public assistance, food stamps, and clothing that many homeless families require) and children's needs (eg, diapers; Special Supplemental Nutrition Program for Women, Infants, and Children; clothing; school evaluations or placements) that might interfere with women's ability to focus on depression treatment, and (3) simultaneously addressing mental health comorbidities (eg, addressing substance use problems or posttraumatic stress disorder through collaboration with other providers or consultation with the clinic's consulting psychiatrist).

#### **Training and Supervision**

Four hours of initial training were provided to all staff at the intervention clinic and 20 hours to the care manager who was a master's level trained mental health clinician. Three subsequent 2-hour team training sessions were provided over the next 18 months. We completed weekly case supervision calls with the care manager and PCP and monthly calls with a supervising psychiatrist. Calls were designed to determine fidelity in PCP and care manager encounters to recommended collaborative care model components. A fidelity checklist reviewed the basic elements of the collaborative care model to be implemented in patient encounters (eg, symptom assessment, review of selfmanagement and update of patient goal setting, medication compliance if applicable, and treatment modifications when necessary) and was completed on the list of active cases reviewed at each call. Fidelity to the components was uniformly high in almost all encounters, and, typically, components were skipped only if the patient was in crisis and the encounter needed to focus on the proximal issues to the exclusion of depression monitoring. The care manager also periodically provided taped recordings of engagement interviews for more focused clinical supervision using an evaluation guideline developed by Grote et al.<sup>16</sup>

#### Implementation

After a positive PHQ-9 screen, both the PCP and the care manager met with the patient to do intake and treatment planning sessions and determine if there were other health, mental health, or support issues to address. The care manager's role was to obtain a psychosocial history, identify unmet basic needs, and implement a treatment engagement interview. The initial case management session was modeled after the patient engagement work of Grote et al<sup>16</sup> and focused on allowing the patient to tell her history, identify concerns about and barriers to depression treatment, and participate in treatment and self-management decisions.

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The PCP assessed depression in the context of other health care needs and initiated treatment planning, which included regular meetings with the care manager, prescribing medication, potential for outside psychotherapy referral, and follow-up. The PCP was the primary prescriber for antidepressant medications unless the team decided that the consulting psychiatrist needed to monitor patients with comorbidities or multiple medications. Referrals to community-based counseling and substance abuse programs were made when deemed appropriate and the patient was willing to initiate outside services. Guidance on addressing comorbidities was provided to the PCP and care manager during training and through psychiatric supervision. Weekly or biweekly outreach was conducted for 6-8 weeks followed by as-needed visits or check-ins for 6 months to support follow-through with treatment recommendations. Periodic PHQ-9 reassessment measured treatment progress.

#### **Study Method**

At the baseline interview, the research coordinator obtained informed consent and completed an interview that collected information about demographic characteristics, housing, employment, income, insurance status, and stressful life events and administered standardized mental and physical health measures. The research coordinator contacted participants again 3 months and 6 months after baseline to readminister mental and physical health measures and to obtain feedback on their relationship with the care manager and PCP. Attempts to contact participants for follow-up study data collection were made repeatedly to those residing in the shelter and those who had left the shelter for up to 2 months after the last follow-up time point.

#### Measures

The depression screening measure, the PHQ-9,<sup>12,17,18</sup> was utilized to determine primary eligibility for the study, with a score  $\geq$  10 triggering referral for study participation. The Hopkins Depression Symptom Checklist–Depression Scale 20<sup>19,20</sup> was used to confirm depression symptoms at baseline and to document the primary outcome of reduction in depressive symptoms at follow-up. A score  $\geq$  0.75 indicates presence of depressive symptoms; a score  $\geq$  1.75 indicates moderate to severe depression.<sup>21</sup>

Additional measures used to evaluate comorbidities and possible confounders included the Posttraumatic Diagnostic Scale<sup>22</sup> to determine stress related to violence and other It is illegal to post this convrighted d PDF on any website. hreatening events at baseline, the 10-item Drug

	Study					
	Intervention	Usual Care				
Variable	(n=42)	(n=25)	P Value			
Age, mean (SD), y	35.2 (8.5)	38 (10.6)	.40			
Marital status, n (%)			.09			
Married	4 (9.5)	8 (32.0)				
Separated/divorced/widowed	7 (16.7)	4 (16.0)				
Never married	24 (57.1)	12 (48.0)				
Other/don't know	7 (16.7)	1 (4.0)				
Participant race, n (%)		- ()	.89			
White	8 (19.0)	6 (24.0)				
Black	20 (47.6)	13 (52.0)				
Combination/other	12 (28.6)	5 (20.0)				
None specified	2 (4.8)	1 (4.0)				
Hispanic/Latina	18 (42.9)	9 (36.0)	.58			
No. of children, median (SD)	2 (3.1)	3 (2.0)	.01			
chick school	17 (40 E)	11 (44 0)	.90			
< http://www.common.com//commons.com//com//commons.com//com//com//com//com//com//com//com/	17 (40.5)	0 (22 0)				
right school/GED/vocational/trade/business	14 (55.5)	8 (52.0)				
> high school	11 (26.2)	6 (24.0)				
Total income median (SD) LISS	756 (652)	882 (603.2)	68			
Currently employed n (%)	5 (12 2)	4 (16 0)	.00			
Ever employed for $> 30$ hours/wk and for at	37 (88 1)	20 (80 0)	.72			
least 6 mo. n (%)	57 (00.1)	20 (00.0)	.+0			
Currently able to work n (%)	26 (70 3)	11 (47 8)	08			
> 1 episodes of homelessness, n (%)	19 (46.3)	16 (66.7)	.11			
Insurance type, n (%)		,	.56			
Other insurance	0 (0)	1 (4.0)				
Medicaid (any type)	35 (85.4)	20 (80.0)				
No benefits	6 (14.6)	4 (16.0)				
Trauma and stressful life events		. ,				
Physical or social abuse p (%)						
Abuse as a child	32 (86 5)	18 (75 0)	32			
Abuse as an adult	32 (84 2)	21 (87 5)	1 00			
Abuse as both a child and adult	28 (100)	15 (100)	.35			
Any abuse as a child or adult	36 (97.3)	24 (100)	1.00			
Family member has died of an accident/homicide.	22 (52.4)	8 (32.0)	.11			
n (%)	(* ,	- ( /				
Experienced death of a child, n (%)	6 (14.3)	7 (28.0)	.17			
Present when someone was killed/injured, n (%)	17 (40.5)	14 (56.0)	.38			
Experienced physical violence from family	31 (75.6)	18 (72.0)	.75			
member/someone you know, n (%)						
Experienced physical violence from someone	11 (26.8)	10 (40.0)	.27			
you don't know, n (%)						
Ever been sexually assaulted by family member,	22 (52.4)	16 (64.0)	.35			
n (%)						
No. of traumatic exposures, mean (SD)	2.7 (1.8)	3.1 (1.8)	.40			
Been sexually assaulted by someone you don't	6 (14.6)	5 (20.0)	.64			
know, n (%)						
Health characteristics						
SF-8 physical health score, mean (SD)	46.4 (8.2)	41.3 (7.6)	.02			
Treated in emergency room in previous 3 mo, n (%)	14 (33.3)	12 (48.0)	.23			
Stayed overnight in hospital, n (%)	11 (26.2)	4 (16.0)	.38			
No. of chronic illnesses reported, mean (SD)	2.5 (1.6)	2.7 (2.0)	.80			
No. of chronic illnesses reported, n (%)			.67			
0–1	13 (31.0)	9 (36.0)				
≥2	29 (69.1)	16 (64.0)				
Mental health and substance abuse						
SF-8 mental health score, mean (SD)	30.5 (11.8)	26.3 (10.3)	.16			
Been treated for depression in previous 3 mo, n (%)	9 (21.4)	3 (12.0)	.31			
Above threshold for general anxiety disorder, n (%)	24 (57.1)	17 (68.0)	.38			
Posttraumatic stress disorder trauma score, n (%)						
Mild	10 (23.8)	4 (16.0)	.74			
Moderate	7 (16.7)	5 (20.0)				
Moderate/severe	25 (59.5)	16 (64.0)				
Moderate to high risk of substance abuse (DAST),	4 (9.5)	4 (16.0)	.46			
n (%)	3 (7 1)	2 (0 0)	1.00			
Harmful or nazardous drinking (AUDIT-C), n (%)	3 (7.1)	2 (8.0)	1.00			
Abbreviations: AUDIT-C = Alcohol Use Disorders Identification Test–Consumption,						

DAST = 10-item Drug Abuse Screening Test, SF-8 = Medical Outcomes Study 8-item Short-Form Health Survey.

Abuse Screening Test<sup>23,24</sup> to ascertain misuse of prescription or street drugs and the Alcohol Use Disorders Identification Test-Consumption<sup>25</sup> to screen for comorbid alcohol use problems at baseline and follow-up, the Medical Outcomes Study 8-item Short-Form Health Survey (SF-8)<sup>26</sup> to ascertain general physical and mental health at baseline and follow-up, and the 7-item Generalized Anxiety Disorder scale<sup>27</sup> to identify generalized anxiety at baseline and follow-up.

The quality of the relationship with the PCP was measured by the 15-item Patient Reactions Assessment.<sup>28</sup> The quality of the relationship with the care manager was measured using the Helping Alliance Questionnaire.<sup>29</sup> Finally, data on visits to the care manager and PCP for both groups and on antidepressant medication use were recorded in the clinical electronic medical record and extracted and analyzed at the end of the study.

#### Analysis

Data were analyzed using Stata/MP software version 12.1 (StataCorp LP, College Station, Texas). Differences between intervention and usual-care groups for categorical variables were quantified using a  $\chi^2$  statistic and a Fisher exact test statistic for those with cell counts < 5. A *t* test was used to test the differences in continuous measures when the distribution of the measure was approximately normal, and a Wilcoxon rank-sum test was used when the distribution was skewed. Significant predictors of the continuous Hopkins Symptom Checklist depression score and the dichotomous indicator of 50% improvement in the depression score by end of follow-up were explored using multivariable linear and logistic regression models.

Rates of follow-up at 6 months were similar in both groups, but a significant number of women were lost to follow-up. Demographic, physical, and mental health baseline characteristics were similar between those who completed the study and those who did not. Those who experienced physical violence from someone they did not know (23.9% vs 50.0%) and those with an increased number of traumatic exposures (2.6 vs 3.5) were more likely to be lost to follow-up. All women who completed a 6-month visit were included in the analysis.

#### RESULTS

A total of 328 women were screened. This number represents over 90% of all mothers entering the shelters during this time period. The mean PHO-9 score for all screened was 8.2 (SD = 6.6). Over one-third of women (37.5%)screened positive with a PHQ score  $\geq 10$ . Of the

## Figure 2. Depression Outcome: Intervention Versus Control



123 women who screened positive, 39 left the shelters before the study could be explained and additional information collected. This was because city policy was to provide temporary shelter while final determination for longer-term shelter was investigated. If women were not deemed eligible for publicly funded shelter (eg, they had some type of prior shelter violation), they were discharged quickly. Additionally, 17 women did not meet other study criteria after meeting with the study coordinator, and 67 eligible women (63.2%) completed the baseline interview. Of the 17 women who met with the study coordinator, only 1 refused to enroll in the study, 4 were ineligible due to pregnancy, 6 had evidence of active psychoses, and 6 were already involved in ongoing mental health treatment. Figure 1 shows the sample from screening through enrollment and follow-up.

Table 1 presents baseline characteristics of the sample by study condition. Women in both conditions were similar in all characteristics except for number of children (P=.01) and SF-8 physical health score (P=.02). Women were on average 36 years of age (intervention: 35.2 years, usual care: 38 years); 52.2% had been homeless before. The majority of women were on Medicaid (intervention: 85.4%, usual care: 80%). Almost 100% of women in both groups reported a past history of childhood or adulthood abuse (intervention: 97.3%, usual care: 100%). Women reported an average of 3 chronic illnesses (intervention: 2.5, usual care: 2.7).

We observed a significant drop in the continuous depression score for all women by the end of follow-up (-0.27, 95% CI = -0.50 to -0.05, P = .02 for time trend) (Figure 2). Table 2 presents outcome measures at baseline and follow-up by study condition. There were no significant differences detected between study groups in the continuous depression outcome measure at follow-up; however, the difference in the proportion of women achieving  $\geq$  50% improvement in depression symptoms at 6 months approached significance (intervention: 30%, usual care: 5.9%, P = .07). Self-report of receiving current depression

treatment differed significantly between groups at 3 months (intervention: 60%, usual care: 20%, P=.01) and 6 months (intervention: 40%, usual care: 5.9%, P=.01). Women in the intervention group also had significantly more PCP and care manager visits at both 3-month (74.3% vs 53.3% with  $\ge 2$  PCP visits, P=.009; 91.4% vs 26.7% with  $\ge 2$  care manager visits, P<.001, respectively) and 6-month (46.7% vs 23.5% with  $\ge 2$ PCP visits, P=.003, respectively); 70% vs 17.7% with  $\ge 2$  care manager visits, P=.001, respectively) follow-up than women in the control group. Further, by 6-month follow-up, 73.3% of women in the intervention group had been prescribed an antidepressant medication compared to 5.9% of women in the usual-care group ( $P \le .001$ ).

There were no significant differences between groups in anxiety, mental or physical health functioning, the Patient Reactions Assessment, or the Helping Alliance Questionnaire at follow-up. Our modeling of continuous depression outcome and 50% improvement including variables such as age, baseline depression scores, baseline anxiety, baseline general health, number of care manager and PCP visits, use of medication, and intervention condition revealed that only baseline depression and anxiety scores predicted 6-month depression scores for the continuous variable. There were no significant predictors of 50% improvement in depression score, but, similar to the bivariate outcome, the intervention condition was close to marginally significant controlling for baseline characteristics in predicting improvement (P=.103).

In terms of employment, at 6-month follow-up, 33% of intervention group mothers reported working currently compared to 12% at baseline. There was little change in baseline and follow-up employment status among the usualcare group (16% and 15%, respectively). In terms of housing status, at 6-month follow-up, both groups had similar situations in terms of housing with more than half of women still in shelters (intervention: 66% vs usual care: 70%).

#### DISCUSSION

This study provides information on depression rates and associated comorbidities among homeless mothers receiving primary care. A recent review<sup>30</sup> highlighted the dated nature of the homeless families' literature and the need for current research to guide the public health community. Despite high levels of reported depression among homeless mothers, little progress has been made in developing and testing treatment strategies that target this group.<sup>31</sup> To our knowledge, this study is the first in the scientific literature to test the feasibility of, and report pilot results from, a treatment study for homeless mothers with depression.

Over one-third of the mothers receiving primary care in our study screened positive for depression. While this represents a lower rate than older studies,<sup>3</sup> it is 2–4 times the rate of comparable low-income women attending publicsector health care settings.<sup>32,33</sup> Not surprisingly, depression was accompanied by high rates of mental health and physical health comorbidities and recent medical hospitalization. Almost all women had multiple traumatic exposures, a factor

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	Baseline		3 Months		6 Months	
	Intervention	Usual Care	Intervention	Usual Care	Intervention	Usual Care
Variable	(n=45)	(n=25)	(n=35)	(n=15)	(n=30)	(n=17)
Hopkins Symptom Checklist score, mean (SD)	1.9 (0.9)	2.0 (0.8)	1.7 (1.0)	1.9 (0.7)	1.6 (1.1)	1.8 (0.7)
	P=.64		P=.57		P=.37	
≥ 50% improvement in Hopkins Symptom Checklist score a	at 6 mo, n (%)					
No					21 (70.0)	16 (94.1)
Yes					9 (30.0)	1 (5.9)
					P=.07	
GAD-7 anxiety score: 2 categories, n (%)						
Below the threshold	18 (42.9)	8 (32.0)	18 (51.4)	4 (26.7)	15 (50.0)	7 (41.2)
Above the threshold	24 (57.1)	17 (68.0)	17 (48.6)	11 (73.3)	15 (50.0)	10 (58.8)
	P = .	.38	P=.13 P=.56			
Self-report of current depression treatment, n (%)						
No	39 (92.9)	24 (96.0)	14 (40.0)	12 (80.0)	18 (60.0)	16 (94.1)
Yes	3 (7.1)	1 (4.0)	21 (60.0)	3 (20.0)	12 (40.0)	1 (5.9)
	P = T	1.0	P=.01		P =	.01
Currently employed, n (%)						
Νο	36 (87.8)	21 (84.0)	21 (70.0)	10 (76.9)	14 (66.7)	11 (84.6)
Yes	5 (12.2)	4 (16.0)	9 (30.0)	3 (23.1)	7 (33.3)	2 (15.4)
	P=.	.72	P =	.73	P =	.43
If currently employed, number of hours working per wk, n	(%)					
<20	1 (20.0)	1 (33.3)	1 (11.1)	1 (33.3)	0 (0)	1 (50.0)
≥20	4 (80.0)	2 (66.7)	8 (88.9)	2 (66.7)	7 (100)	1 (50.0)
	P=1.0 $P=.46$ $P=.22$					
Current housing situation, n (%)						
Bushwick/Briarwood shelter	42 (100)	25 (100)	28 (80.0)	13 (86.7)	18 (60.0)	11 (64.7)
Your own/someone else's home	0 (0)	0 (0)	5 (14.3)	2 (13.3)	8 (26.7)	4 (23.5)
Hospital or other treatment program	0 (0)	0 (0)	0 (0)	0 (0)	1 (3.3)	0 (0)
Another shelter	0 (0)	0 (0)	2 (5.7)	0 (0)	2 (6.7)	1 (5.9)
Group home/transitional housing/hotel/other place	0 (0)	0 (0)	0 (0)	0 (0)	1 (3.3)	1 (5.9)
			P =	.54	P=	.79
No. of primary care physician visits, n (%)						
0			2 (5.7)	6 (40.0)	9 (30.0)	13 (76.5)
1			7 (20.0)	1 (6.7)	7 (23.3)	0 (0)
≥2	•••		26 (74.3)	8 (53.3)	14 (46.7)	4 (23.5)
			P=.009		P=.003	
No. of care manager visits, n (%)						
0			2 (5.7)	7 (46.7)	8 (26.7)	11 (64.7)
1			1 (2.9)	4 (26.7)	1 (3.3)	3 (17.6)
≥2			32 (91.4)	4 (26.7)	21 (70.0)	3 (17.7)
<i>P</i> =.001 <i>P</i> =.001						
Started antidepressant/antianxiety medication during stuc	dy from clinic reco	ord, n (%)				
No		•••			8 (26.7)	16 (94.1)
Yes					22 (73.3)	1 (5.9)
					P<.	.001
SF-8 physical component score, mean (SD)	46.4 (8.2)	41.3 (7.6)	46.9 (8.6)	42.9 (12.6)	46 (9.6)	41.5 (12.2)
	P=.02 P=.20 P=.17					
SF-8 mental component score, mean (SD)	30.5 (11.8)	26.3 (10.3)	37.1 (11.4)	34.2 (12.2)	35.9 (13.5)	37.2 (12.6)
	P=.	.16	P=.42 P=.76			
Patient Reactions Assessment score, mean (SD)		5,3 (0,5) 4,9 (0,5) 5,4 (0,5) 5,1 (0,7)				
			P=	.05	P=	.41
Helping Alliance Questionnaire score, mean (SD)			5.3 (0.5)	4.6 (1.2)	5.1 (0.7)	5.2 (0.5)
			P=	.14	P=	.87

Abbreviations: GAD-7=7-item Generalized Anxiety Disorder scale, SF-8=Medical Outcomes Study 8-item Short-Form Health Survey.

that has been commonly associated with depression<sup>34</sup> and has been described as common among homeless mothers.<sup>3,35</sup> Our findings highlight the importance of primary care settings recognizing and addressing these conditions together.

Despite high rates of depression, less than 20% of mothers in our study had received recent depression treatment. Our findings concur with prior research describing that the majority of homeless mothers with depression symptoms do not receive treatment.<sup>3,6</sup> Numerous barriers contribute to why homeless mothers fail to seek mental health treatment including prior negative experiences with the health care system,<sup>30,35</sup> stigma,<sup>36</sup> fear of child welfare intervention,<sup>7</sup> and mothers' belief that a change in life circumstances would relieve their depression rather than treatment.<sup>37</sup> Therefore, targeting homeless mothers for depression screening in less stigmatizing primary care settings, including shelter-based primary care clinics, has the potential to more readily engage women and address their multiple medical and mental health issues.

Overall, we found few differences in primary or secondary outcomes between intervention and usual-care

It is illegal to post this cop participants. However, the difference in the proportion women achieving at least a 50% improvement in depression symptoms at 6 months, a commonly used measure of treatment improvement,<sup>38</sup> approached significance among intervention group women. Additionally, the intervention appeared to better engage women to participate in treatment. Compared to women in the usual-care group, intervention participants were significantly more likely to be receiving depression treatment at 3- and 6-month follow-up, were more likely to be receiving antidepressant medication, and had more visits with the care manager and PCP. While this small pilot study did not have the power to demonstrate significant mean depression score differences between intervention and control women at 6-month follow-up, there was some evidence that more intervention women improved by a clinically significant degree. It is possible that improvement in depression outcomes may have been detected with a larger sample or longer follow-up period. It is also possible that our intervention was not intensive enough to show differences given that women in the usual-care group were also linked with a PCP who provided depression treatment and had access to case management services.

While there is good evidence that counseling and medication treatment improve depression outcomes,<sup>21</sup> considerable effort is still needed to successfully engage lowincome, ethnically diverse women with depression treatment. The ICMHM utilized components that may have contributed to the observed improvements in treatment participation in the intervention group. The ICMHM adapted an engagement approach developed by Grote et al<sup>16</sup> designed to engage and retain low-income women in care by conducting a session at the outset of depression treatment that aims to build trust and address women's concerns and resistance to depression treatment. This session, which was condensed to 20 minutes and conducted by a care manager rather than a therapist as in Grote's study, enabled the care team to proactively address concerns that might limit mothers' participation in care. It is also possible that other aspects of the model, including addressing children's unmet needs and blending depression care with managing basic needs, supported mothers in the intervention group to participate more actively in care.

We did not detect significant differences in housing or employment, although there was a trend for intervention women to more likely be working at follow-up. There were no detectable differences in housing status at follow-up. Past studies<sup>39,40</sup> suggest that homeless families' characteristics, including depression, may have less bearing on the entry to and exit from shelter compared to policy, program, and resource factors. Nevertheless, it is critical to identify effective ways to address depression among homeless mothers given its common occurrence and associated adverse consequences for mothers and their children.

This pilot study found that implementing an adapted collaborative care model was feasible in a shelter-based primary care clinic. Heightened awareness about the importance of identifying depression, training on the use of the screening measure, and buy-in by leadership facilitated anted PDF on any website. more routine intervention. While engagement in depression care was significantly improved for the intervention women compared to usual care, there still remained barriers to fully implementing the collaborative care model that may explain the lack of strong differences between the 2 groups. For example, compliance with follow-up visits was often prevented by shelter rules that required women's attendance at mandatory meetings and housing search efforts. Some families were also discharged abruptly, making continuity and a long enough period of care difficult to achieve. Procedures to routinely collaborate between the shelter and health care teams did not appear to be in place, although communication on behalf of specific families did occur at times. Strengthening communication between health care providers and shelter staff might allow for the modification of shelter requirements so mothers can attend needed health visits. Clinics may need to offer flexible hours during the weekend or evening when mothers may have fewer conflicts that interfere with appointments. When possible, alerting the health providers to an upcoming discharge from the shelter would allow them to create a bridge to a health setting in the family's new community or neighborhood. Building effective linkages between homeless health care programs and community health care programs may allow for improvements in care continuity. Given that many homeless families may move to housing in a different geographic area than where sheltered, coordinating needed services for depression may be necessary across not only health care sites but also with other types of community settings.<sup>41</sup>

Our study is limited in that the sample size is small and we do not have data on those who refused screening or did not complete the baseline interview. Also, our results may only generalize to urban areas with similar shelter eligibility criteria. s illegal to post this copyrighted PDF on any website

Health care reform, the emergence of patient-centered medical homes, and a growing evidence base suggesting that behavioral health and primary care services can be effectively integrated offer important opportunities to more effectively serve homeless mothers. The Affordable Care Act provides funding that encourages states and health providers to develop innovative health care models for high-risk populations. Untreated depression may interfere with mothers' ability to care for their children, successfully pursue employment and education, and maintain housing. Unaddressed mental health needs may also interfere with the success of current federal homeless policies to facilitate rapid rehousing. The adapted collaborative care model appears promising as an approach to address the significant need for depression treatment among homeless mothers. This feasibility study provides important information to use in refining the intervention to improve access to depression treatment for a hard-to-reach high-risk population.

Submitted: November 10, 2015; accepted January 29, 2016.
Published online: April 14, 2016.
Potential conflicts of interest: None reported.
Funding/support: This research was supported by a grant from the National Institute of Mental Health (R34MH085881).

#### Weinreb et al It is illegan to post this copyrighted PDF on any website Role of the sponsor: the funding agency Integrating behavioral health services for

played no role in the design and conduct of the study; collection, management, analysis, and interpretation of data; or preparation, review, or approval of the manuscript.

Acknowledgments: The authors thank the Care for the Homeless service delivery team for their participation in the study, Karen Johnson, PhD (Columbia University, School of Social Work, New York, New York) for her effort in conducting the research field operation, and Carol Caton, PhD (Columbia University, Department of Psychiatry, New York, New York) from Columbia Homelessness Prevention Center for her conceptual contributions to the study and contribution to the field operation supervision. They also thank Nancy Grote, PhD (University of Washington, School of Social Work, Seattle, Washington) for her conceptual contribution to the study and Wayne Katon, MD (University of Washington Medical School, Department of Psychiatry and Behavioral Sciences, Seattle, Washington [deceased]) who contributed to the conceptualization and implementation of the study and will be deeply missed. None of the acknowledged individuals report conflicts of interest related to the subject of this article.

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