Depression is one of the most common mental health disorders that afflict persons infected with the human immunodeficiency virus (HIV).\(^1\)\(^2\) Despite available and efficacious treatments for depression, evidence suggests underdiagnosis and undertreatment of depression in routine HIV care.\(^3\)\(^4\) Depression in persons with HIV may be associated with accelerated HIV disease progression,\(^5\)\(^6\) decreased immune functioning,\(^7\)\(^8\) nonadherence to HIV medication regimens,\(^9\)\(^10\)\(^11\) and increased risk of mortality.\(^12\)\(^13\)\(^14\) Depression is a modifiable risk factor, and effective treatment may improve HIV outcomes.\(^15\)\(^16\)\(^17\)

In general adult primary care, collaborative care for depression is effective\(^18\)\(^19\)\(^20\) and cost-effective.\(^21\)\(^22\) Collaborative care models are based on the chronic care model,\(^23\) facilitating collaboration between primary care and specialty mental health care providers to improve the quality of depression care and outcomes. Compared with referral specialty mental health care models, collaborative care allows patients to receive care in more accessible and less stigmatizing settings.

To our knowledge, no one has tested the collaborative care model for depression in a long-term specialty physical health care setting. This is an important gap because, for many patients with complex chronic illnesses, specialty physical health care clinics become their primary source of health care or “medical home.”\(^24\)

For several reasons, the treatment of HIV and depression may be a potential model for testing the exportability of a collaborative care approach, first developed for primary care settings, to specialty-driven...
long-term care of disease. Modern combination antiretroviral therapy has transformed HIV into a chronic disease, and the complexity of HIV care may be shifting care from primary to specialty care settings. Organizational complexities are also associated with collaborative care interventions in HIV clinic settings given specialty care, training, organizational structure, and culture.

The goal of this study was to adapt an evidence-based primary care model of collaborative care of depression to HIV clinic settings and evaluate the model’s clinical effectiveness. We hypothesized that depressed patients who were assigned to the HIV Translating Initiatives for Depression Into Effective Solutions (HITIDES) intervention would report improved depression severity (primary outcome) and improved health-related quality of life, health status, HIV symptom severity, and medication regimen adherence (secondary outcomes) compared with patients receiving usual care.

### METHODS

#### DESIGN

The HITIDES study was a randomized controlled effectiveness trial comparing depression collaborative care with enhanced usual care. Three Veterans Affairs (VA) HIV treatment facilities participated in the study. The study was approved by the research and development committees at the Central Arkansas Veterans Healthcare System, Michael E. DeBakey VA Medical Center, and Atlanta VA Medical Center.

### PARTICIPANTS

Inclusion criteria were (1) a current 9-item Patient Health Questionnaire (PHQ-9) depression score of 10 or higher and (2) current treatment in the VA HIV clinic. A PHQ-9 score of at least 10 has strong psychometric properties in primary care settings (eg, >99% sensitivity and a 91% specificity). Exclusion criteria were (1) no access to a telephone, (2) current acute suicidal ideation, (3) significant cognitive impairment as indicated by a score higher than 10 on the Blessed Orientation-Memory-Concentration Test, and (4) history of bipolar disorder or schizophrenia. There were no exclusions based on physical health criteria, substance abuse or dependence, or current specialty mental health treatment.

The VA health care system provides health care to US veterans at more than 1400 medical centers and clinics nationwide. The VA is the largest national health care system and the largest single provider of HIV care. Veterans treated for HIV infection are older than the average US adult with HIV and more often male. Most of the 23,463 individuals in VA HIV care in 2008 were men (97%) and older than 50 years (64%). The proportion of African American patients (46%) is similar to the US HIV population (VA Clinical Case Registry, available at http://www.hiv.va.gov/). In general, veterans are eligible for care based on the length and character of their military service and current annual income level. In 2003, the VA stopped enrolling higher-income veterans.

After completing the eligibility and written informed consent processes, participants were randomly assigned to the intervention or to usual care and completed the baseline assessment. Participants were randomized to the intervention or to usual care in a 1:1 ratio according to a computer-generated random assignment sequence stratified by clinic and generated in advance. Research assistants at each clinic were provided envelopes labeled by participant number and containing randomized assignment. Participants were enrolled from February 1, 2007, through June 30, 2008.

### DEPRESSION SCREENING AND INTERVENTION ADAPTATION BY CLINIC

Consistent with other collaborative care research, depression screening methods were adapted and adopted at each clinic as part of routine care using the PHQ-9 (2 clinics) or the 8-item PHQ (PHQ-8) (1 clinic) and completed in person (2 clinics) or in person and by mail (1 clinic) before each HIV clinic visit. The intent was to complete the depression screen at each HIV clinic visit. The patient delivered a hard copy of the PHQ-9 or PHQ-8 to the HIV clinician at the time of the clinic visit. The PHQ-9 was completed by research personnel to confirm eligibility for the clinic that used the PHQ-8 as the depression screening instrument. A recent expert panel supported the use of the PHQ-9 in patients with HIV.

Intervention adaptations were consistent across all clinics and included adding a clinical pharmacist to the intervention team, allowing substance-dependent patients to participate, adding brief alcohol and other drug interventions to the intervention, allowing patients engaged in specialty mental health care to participate, and formatting the intervention electronic medical record notes. The HIV staff conducted the depression screening, and the research team delivered the intervention.
HITIDES INTERVENTION

The purpose of the HITIDES intervention was to support HIV and mental health clinicians in delivering evidence-based depression treatment. The HIV depression care team consisted of a registered nurse depression care manager (DCM), a clinical pharmacist, and a psychiatrist (J.M.P.). This team was located off-site at the Little Rock VA Medical Center and convened once a week and as needed by telephone or in person. The depression care team communicated with treating clinicians via electronic medical record progress notes. The DCM communicated with patients via telephone. The HITIDES depression care team made treatment suggestions. Treatment decisions were made by the HIV or mental health clinicians at each site.

The DCM delivered the following intervention components: participant education and activation,32 assessment of treatment barriers and possible resolutions, depression symptom and treatment monitoring, substance abuse monitoring, and instruction in self-management (eg, encouraging patients to exercise and participate in social activities).33,34 The DCM used prewritten scripts, which are standardized instruments that were supported by the Web-based decision support system (NetDSS, available at https://www.netdss.net) during these telephone encounters.

The intervention used a stepped-care model for depression treatment.35 The 3-step model included the following components plus DCM monitoring: (1) watchful waiting, (2) depression care team treatment suggestions (counseling or pharmacotherapy, considering participant preference), (3) pharmacotherapy suggestions after review of depression treatment history by the clinical pharmacist, (4) combination pharmacotherapy and specialty mental health counseling, and (5) referral to specialty mental health. Specific treatment suggestions were based on the Texas Medication Algorithm Project36 and VA/Department of Defense Depression Treatment Guidelines.37 Although the depression care team did not suggest watchful waiting, patient/provider treatment negotiations could result in this approach. At any time, HIV health care providers were free to refer participants directly to specialty mental health care. The stepped-care model was used to increase treatment intensity when participants did not respond to treatment.

The DCM conducted telephone-based monitoring every 2 weeks during acute treatment (before achieving a sustained 50% decrease in PHQ-9 score) and every 4 weeks during watchful waiting or continuation treatment (for 2 months after maintaining remission [PHQ-9 score, <5] or 6 months after maintaining a 50% decrease in the PHQ-9 score). The NetDSS system identified potential treatment nonresponse as (1) antidepressant regimen adherence of less than 80% during the past 14 days, (2) counseling nonadherence of less than 75% during the past month, (3) participant report of a 5-point increase in depression severity from the enrollment PHQ-9 score based on 2 consecutive DCM encounters, or (5) lack of participant response (<50% decrease from enrollment PHQ-9 score during 2 consecutive DCM encounters) during an 8-week antidepressant or 12-week counseling trial.

USUAL CARE

Intervention and usual care participants completed PHQ depression screens as described, and patients delivered hard-copy results to their HIV clinicians at most clinic visits. These results were used to identify depression and monitor treatment response. Usual care depression treatment was provided by HIV or mental health clinicians without involvement of the HITIDES depression care team. Before starting the study, all HIV health care providers received 1 hour of HIV and depression training. Specialty mental health referral procedures were reviewed at all sites and typically included at least 1 failed depression treatment trial before referral.

DATA COLLECTION

Baseline and 6- and 12-month data were collected by telephone interviewers who were blinded to treatment assignment and used scripted computer-based assessments. At baseline, demographics (including self-reported race according to categories provided by the interviewers), depression history, and chronic physical health conditions (besides HIV) were measured using the Depression Outcomes Module.38,39 Mental health comorbidity was measured using the Mini International Neuropsychiatric Interview.40 Acceptability of antidepressant treatment was measured using an item developed for the Quality Improvement for Depression studies.41 Follow-up data-collection interviews were completed for 226 of 249 participants (90.8%) at 6 months and 215 of 249 (86.3%) at 12 months (Figure 1).

OUTCOME MEASURES

The primary outcomes listed in clinicaltrials.gov were depression severity, implementation process, and quality of care. Implementation process and quality of care will be addressed in separate reports. Secondary outcomes were health status, health-related quality of life, HIV symptom severity, HIV medication regimen adherence, antidepressant regimen adherence, treatment satisfaction, and cost-effectiveness. Treatment satisfaction and cost-effectiveness also will be addressed in separate reports.

Depression symptom severity during the past 2 weeks was measured using the 20-item Hopkins Symptom Checklist (SCL-20),44 which includes the 13-item depression scale plus 7 depression-related items from the Hopkins Symptom Checklist 90–Revised. The items are scored from 0 to 4 and averaged to provide a mean depression severity score ranging from 0 to 4.

Depression treatment response at 6 and 12 months was defined as a 50% or greater decrease in the mean SCL-20 score compared with baseline, and remission at 6 and 12 months was defined as a mean SCL-20 score of less than 0.5. Depression-free days (DFDs) were calculated as a summative measure of depression severity based on baseline and 6- and 12-month SCL-20 data using formulas originally developed by Lave and colleagues45 and adapted for the SCL-20.46 For each assessment, an SCL-20 score of 0.5 or less was considered depression free, a score of 2.0 or higher was considered fully symptomatic, and scores in between were assigned a linear proportional value. Derivation of DFDs from the SCL-20 has been used in several influential primary care studies.47–49

Health status was measured using the physical and mental health component summary scores from the Medical Outcomes Study Veterans 12-Item Short-Form Health Survey.50 Health-related quality of life was measured using the Quality of Well-Being Self-administered Scale (QWB-SA).51,52 The QWB-SA score is derived from general population preference weights and ranges from death (0.0) to perfect health (1.0). Severity of HIV symptoms was measured using the 20-item Symptoms Distress Module, which summarizes the degree to which each symptom bothered the participant in the past 4 weeks on a scale from 0 (“I do not have this symptom”) to 4 (“This symptom bothers me a lot”).53 Bothness of HIV symptoms were defined as scores of 3 or 4.

Antidepressant and HIV medication regimen adherence were measured separately using the AIDS Clinical Trial Group Group assessment, which asks participants to report the number of pills per day they are supposed to take and the number of pills they
skipped taking for each medication for each of the past 4 days. Percentage of adherence equaled the total number of prescribed pills taken divided by the total number prescribed during the past 4 days. Dichotomous antidepressant regimen adherence was defined as greater than or equal to 80% adherence, and HIV medication regimen adherence was defined as greater than or equal to 95% adherence.

**ANALYSIS**

Participants were the unit of the intent-to-treat analysis. Sample size calculations were based on preliminary 6-month data from the Telemedicine Enhanced Antidepressant Management Study. The Telemedicine Enhanced Antidepressant Management Study was a depression collaborative care study conducted in VA community-based outpatient clinics. We based the power calculation on detecting an 11% difference in the percentage of responders between intervention and usual care using a 1-tailed test ($\alpha = .05$). A sample size of 280 (140 subjects per arm) would provide 74% power. We did not adjust for potential nesting of participants within parent VA medical centers because the intraclass coefficient (0.02) was close to zero with respect to changes in SCL-20 scores ($P = .30$), and there were no significant differences in outcomes across sites. Missing values were imputed using multiple imputation methods (ie, SAS statistical software, version 9.2, PROC MI and PROC MIANALYZE; SAS Institute Inc, Cary, North Carolina). Because of the large number of available case-mix variables, only those found to significantly predict dependent variables at $P < .20$ in bivariate analyses were included in multivariate analyses.

In Table 1, categorical variables were compared using a $\chi^2$ test, and continuous variables were compared using a 2-tailed t test or its nonparametric analogue. Logistic and ordinary least squares regression analyses were used to estimate intervention effects for dichotomous and continuous outcomes, respec-

### Table 1. Baseline Sociodemographic and Clinical Characteristics of Intervention and Usual Care Groups

<table>
<thead>
<tr>
<th>Variable</th>
<th>Intervention</th>
<th>Usual Care</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sociodemographic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age, mean (SD), y</td>
<td>49.8 (8.7)</td>
<td>49.8 (10.5)</td>
</tr>
<tr>
<td>Male sex</td>
<td>120 (97.6)</td>
<td>122 (96.8)</td>
</tr>
<tr>
<td>African American race</td>
<td>78 (63.4)</td>
<td>77 (61.6)</td>
</tr>
<tr>
<td>Single/never married</td>
<td>103 (83.7)</td>
<td>98 (77.8)</td>
</tr>
<tr>
<td>High school graduate or higher</td>
<td>118 (95.9)</td>
<td>113 (89.7)</td>
</tr>
<tr>
<td>Annual income ≤ $20,000</td>
<td>60 (50.8)</td>
<td>52 (42.6)</td>
</tr>
<tr>
<td>Clinical</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SF-12V PCS score, mean (SD)</td>
<td>41.5 (12.5)</td>
<td>39.5 (11.6)</td>
</tr>
<tr>
<td>SF-12V MCS score, mean (SD)</td>
<td>34.3 (10.5)</td>
<td>35.1 (11.0)</td>
</tr>
<tr>
<td>SCL-20 score, mean (SD)</td>
<td>1.8 (0.6)</td>
<td>1.9 (0.7)</td>
</tr>
<tr>
<td>QWB-SA score, mean (SD)</td>
<td>0.49 (0.12)</td>
<td>0.44 (0.13)</td>
</tr>
<tr>
<td>Physical health comorbidity score, mean (SD)</td>
<td>3.2 (2.3)</td>
<td>3.8 (2.3)</td>
</tr>
<tr>
<td>PHQ-9, mean (SD)</td>
<td>15.7 (4.2)</td>
<td>16.0 (4.7)</td>
</tr>
<tr>
<td>Major depression</td>
<td>92 (74.8)</td>
<td>98 (77.8)</td>
</tr>
<tr>
<td>Panic disorder</td>
<td>10 (8.1)</td>
<td>18 (14.3)</td>
</tr>
<tr>
<td>Generalized anxiety disorder</td>
<td>74 (60.2)</td>
<td>76 (60.3)</td>
</tr>
<tr>
<td>Posttraumatic stress disorder</td>
<td>34 (27.6)</td>
<td>40 (31.7)</td>
</tr>
<tr>
<td>At-risk drinking</td>
<td>19 (15.4)</td>
<td>26 (20.6)</td>
</tr>
<tr>
<td>Any inpatient mental health admission</td>
<td>33 (26.8)</td>
<td>32 (25.4)</td>
</tr>
<tr>
<td>Any past depression treatment</td>
<td>98 (79.7)</td>
<td>98 (77.8)</td>
</tr>
<tr>
<td>Any depression treatment in past 6 mo</td>
<td>68 (55.7)</td>
<td>67 (53.2)</td>
</tr>
<tr>
<td>Depression treatment type</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Watchful waiting acceptable</td>
<td>88 (71.5)</td>
<td>85 (67.5)</td>
</tr>
<tr>
<td>Antidepressant medication acceptable</td>
<td>88 (72.1)</td>
<td>87 (69.6)</td>
</tr>
<tr>
<td>Individual counseling acceptable</td>
<td>108 (87.8)</td>
<td>113 (89.7)</td>
</tr>
<tr>
<td>Group counseling acceptable</td>
<td>66 (53.5)</td>
<td>76 (60.3)</td>
</tr>
<tr>
<td>Bothersome HIV symptoms, mean (SD), No.</td>
<td>7.8 (4.1)</td>
<td>8.0 (4.3)</td>
</tr>
<tr>
<td>Current anti-HIV prescription</td>
<td>99 (80.5)</td>
<td>99 (78.6)</td>
</tr>
<tr>
<td>Skipped anti-HIV medication in past 4 d</td>
<td>23 (23.2)</td>
<td>28 (28.3)</td>
</tr>
<tr>
<td>Anti-HIV medication adherence, mean percentage (SD)</td>
<td>93.5 (16.2)</td>
<td>91.2 (20.1)</td>
</tr>
<tr>
<td>Current AD prescription</td>
<td>75 (61.0)</td>
<td>78 (61.9)</td>
</tr>
<tr>
<td>Skipped AD in past 4 d</td>
<td>22 (29.3)</td>
<td>20 (25.6)</td>
</tr>
<tr>
<td>AD regimen adherence, mean percentage (SD)</td>
<td>85.4 (30.5)</td>
<td>86.4 (31.1)</td>
</tr>
</tbody>
</table>

Abbreviations: AD, antidepressant; HIV, human immunodeficiency virus; MCS, mental component summary; PCS, physical component summary; PHQ-9, 9-item Patient Health Questionnaire; QWB-SA, Quality of Well-Being Self-administered Scale; SCL-20, 20-item Hopkins Symptom Checklist; SF-12V, Medical Outcomes Study Veterans 12-Item Short-Form Health Survey.

*Unless otherwise indicated, data are expressed as number (percentage) of participants. Percentages reflect the following missing data: race, 1 usual care participant; annual income, 5 intervention and 4 usual care participants; any depression treatment in the past 6 months, 1 intervention participant; and antidepressant acceptable, 1 intervention and 1 usual care participant.

*P < .01 for intervention vs usual care.

*P < .05 for intervention vs usual care.

*The PHQ-9 was used as depression screening measure. The SCL-20 was used as the depression outcome measure.

*Mental health comorbidity was identified using the Mini International Neuropsychiatric Interview.
tively. For the continuous outcome measures DFDs and HIV symptom severity, the residual plots indicated nonconstant variance; therefore, we used weighted least squares regression methods to correct for heteroskedasticity. Residual plots for other continuous outcome measures did not indicate nonconstant variance. Separate regression analyses were conducted to examine the 6- and 12-month outcomes except for DFDs, which were measured for the entire 12-month follow-up period. Hierarchical linear modeling methods were not used because 2 of the primary outcomes (depression response and remission) were defined at only 2 time points, and for consistency we also used this approach with the secondary outcomes. The 9.2 version of the SAS software was used for all analyses.

RESULTS

In general, the HITIDES sample consisted of middle-aged, high school–educated, single, African American men of low to middle income who were experiencing mild to moderate symptoms of HIV disease and reported moderate reductions in health-related quality of life. Most had a history of mood disorder, expressed moderate depression symptom severity, and had received treatment for depression in the preceding 6 months. An important minority (18.1%) met criteria for at-risk drinking. Intervention and usual care participants were similar at baseline on demographic and clinical characteristics, except that intervention participants reported higher (better) health-related quality of life (QWB-SA scores, 0.49 vs 0.44; \(P=.004\)) (Table 1) and lower scores for physical health comorbidities (3.2 vs 3.8; \(P=.046\)) (Table 1).

INTERVENTION FIDELITY

Of the 123 intervention patients, 119 (96.7%) were contacted by the DCM. Initial patient education and activation was completed for 118 (99.2%), initial treatment barriers assessment was completed for 116 (97.5%), and 100% of all DCM contacts completed the PHQ-9 and medication regimen and/or counseling adherence assessment, depending on the current treatment. During the acute phase of treatment, a total of 231 intervention group treatment trials (mean, 1.94) included 110 (47.6%) watchful waiting, 94 (40.7%) pharmacotherapy, 7 (3.0%) counseling, and 20 (8.7%) combination pharmacotherapy and counseling trials. The mean number of DCM intervention telephone contacts per patient during the acute and continuation phases of treatment was 7.2 (SD, 4.5; range, 0-19).

PRIMARY OUTCOME: DEPRESSION SEVERITY

Figure 2 shows the unadjusted total SCL-20 scores over time. The unadjusted SCL-20 scores were not significantly different between the intervention and usual care groups at the 6- or 12-month follow-up. However, the unadjusted treatment response rates at 6 months were 17.5% (22 of 126 patients) for usual care and 33.3% (41 of 123 patients) for the intervention (\(P=.004\)) (Table 2). The adjusted intervention effect on treatment response at 6 months was also significant (odds ratio [OR], 2.60; 95% confidence interval [CI], 1.39-4.86; \(P=.003\)). The unadjusted treatment remission rates at 6 months were 11.9% (15 of 126 patients) for usual care and 22.0% (27 of 123 patients) for the intervention (\(P=.03\)). The adjusted intervention effect on treatment remission at 6 months was also significant (OR, 2.40; 95% CI, 1.10-5.22; \(P=.03\)). Unadjusted and adjusted intervention effects on 12-month response and remission were not significant. Unadjusted (147.3 vs 120.0, \(P=.04\)) and adjusted intervention effects on DFDs were significantly greater in the intervention vs the control group (\(P=19.3; 95\%\, CI, 10.9-27.6; P<.001\)) (Table 3).

SECONDARY OUTCOMES

Significant intervention effects were observed for HIV symptom severity but not for health-related quality of life, health status, antidepressant prescribing, or antidepressant or HIV medication regimen adherence. The adjusted intervention effect resulted in significantly lower 6- and 12-month HIV symptom severity compared with usual care at 6 months (\(\beta=-0.09; 95\%\, CI, -1.58 to 1.40; P<.001\)) and 12 months (\(\beta=-0.82; 95\%\, CI, -1.6 to -0.07; P=.03\)) (Table 3). The depression items in the SCL-20 and the HIV symptom severity measure overlapped (eg, baseline correlation, \(r=0.54; P<.001\)). However, after removing 7 depression-related items from the HIV symptom severity measure, the adjusted intervention effect on HIV symptom severity remained significant at 6 months (\(\beta=-0.62; 95\%\, CI, -1.16 to -0.08; P=.03\)) but not at 12 months (\(\beta=-0.09; 95\%\, CI, -1.58 to 1.40; P=.88\)). The unadjusted and adjusted intervention effects on 6- and 12-month antidepressant prescribing rates, antidepressant regimen adherence, HIV medication regimen adherence, QWB-5A, and Medical Outcomes Study Veterans 12-Item Short-Form Health Survey mental and physical component summary scores were not significant.

COMMENT

To our knowledge, this is the first effectiveness trial of a depression collaborative care intervention in a long-term specialty physical health care setting. Other successful collaborative depression care interventions tar-
Depression is one of the most common co-occurring illnesses among people with complex chronic comorbidities; therefore, developing treatment strategies that are effective in specialty physical health care settings is vital to improving treatment outcomes for these patients. Human immunodeficiency virus may be a particularly important chronic condition model because depression is so prevalent and because treating depression can improve depression outcomes and has the potential to improve a wide range of life-saving self-management and adherence behaviors.18,61

The primary outcomes of this study were a more than doubling of the odds of depression response and remission at 6 but not 12 months and improved DFDs during the 12 months of treatment. Improved depression response and remission outcomes at 6 but not 12 months suggests that depression symptoms improved more rapidly in the intervention group compared with the usual care group. By 12 months, usual care participants caught up with intervention participants in terms of response and remission rates. The adjusted incremental 12-month DFDs result from the HITIDES intervention (19.3 days) compares with 20 to 72 DFDs in non-VA samples45,56,62,63 and 14.6 incremental DFDs during 9 months in a VA sample.22 Secondary outcomes included improved HIV symptom severity but no improvement in health-related quality of life, health status, or self-reported antidepressant or HIV medication regimen adherence.

The usual care depression response and remission outcomes appear to catch up with the intervention group at 12 months. Possible explanations include the following. First, the intervention was tested in settings where clinicians clearly accepted the need for improving depression recognition and treatment in the HIV clinic setting. Second, depression screening was completed on a hard copy form that most patients presented to their HIV clinician at every visit; therefore, over time, the HIV clinicians became more familiar with depression diagnosis and tracking treatment response. Third, DCM notes for intervention patients resulted in HIV clinicians becoming more familiar with treatment options for all patients in the HIV clinic.

Significant improvement in depression and HIV outcomes and the lack of detectable differences in prescribing or adherence suggest that other mechanisms lead to

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### Table 2. Unadjusted and Adjusted Dichotomous Outcome Results

<table>
<thead>
<tr>
<th>Table 2. Unadjusted and Adjusted Dichotomous Outcome Results</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Group, No. (%) of Patients</strong></td>
</tr>
<tr>
<td>Interventions</td>
</tr>
<tr>
<td>Response&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Remission&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>AD prescription&lt;sup&gt;e&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>AD regimen adherence&lt;sup&gt;f&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>HIV medication regimen adherence&lt;sup&gt;g&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

Abbreviations: AD, antidepressant; CI, confidence interval; HIV, human immunodeficiency virus; NNT, number of patients needed to treat to achieve 1 additional successful outcome; OR, odds ratio.

<sup>a</sup>Attrition weights were used for AD prescription, AD regimen adherence, and HIV medication regimen adherence equations. Multiple imputation was used in other analyses.

<sup>b</sup>Number needed to treat was calculated for a given outcome only when the intervention P value was less than .05.

<sup>c</sup>The 6-month baseline covariates were intervention, 20-item Hopkins Symptom Checklist (SCL-20) score, physical health comorbidity, HIV symptom severity, race, any lifetime inpatient mental health admission, and HIV medication prescription. The 12-month baseline covariates were intervention, physical health comorbidity, HIV symptom severity, marital status, any lifetime inpatient mental health admission, any depression treatment in the past 6 months, and HIV medication prescription.

<sup>d</sup>The 6-month baseline covariates were intervention, SCL-20 score, physical health comorbidity, HIV symptom severity, race, comorbid mental health diagnosis, any lifetime inpatient mental health admission, any depression treatment in the past 6 months, and HIV medication prescription. The 12-month baseline covariates were intervention, age, SCL-20 score, physical health comorbidity, HIV symptom severity, and marital status.

<sup>e</sup>The 6-month baseline covariates were intervention, AD prescription, SCL-20 score, HIV symptom severity, race, annual household income, comorbid mental health diagnosis, any lifetime inpatient mental health admission, any depression treatment in the past 6 months, and acceptability of AD medications. The 12-month baseline covariates were intervention, AD prescription, SCL-20 score, physical health comorbidity, HIV symptom severity, race, comorbid mental health diagnosis, any lifetime inpatient mental health admission, any depression treatment in the past 6 months, and acceptability of AD medications.

<sup>f</sup>The 6-month baseline covariates were intervention, age, SCL-20 score, physical health comorbidity, HIV symptom severity, and marital status.

<sup>g</sup>The 6-month baseline covariates were intervention, age, and education. The 12-month baseline covariates were intervention, age, education, and acceptability of AD medications.

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improved depression outcomes. We may have failed to detect medication prescription or adherence effects because of self-report measurement error. The intervention may have led to greater dose intensification or treatment switching not detected by our measurement methods. Another mechanism for depression improvements may have been DCM promotion of self-management activities and/or brief interventions for alcohol and other drug abuse. Possible mechanisms for improved HIV symptom severity include depression intensifying patients’ experience of physical symptoms and/or DCM promotion of patient self-management activities.

The organization of health care into medical homes to provide integrated, accessible, and comprehensive services to patients with chronic and complicated medical needs has been widely promoted. High-quality medical home services from specialists would require provision of specialty and primary care treatments, first-contact/comprehensive care responsibility, and patient affiliation with the clinic as the central hub of care. Long-term care clinics for HIV infection and other complex conditions could, with adoption of appropriate care models, satisfy these criteria. There are also specialty clinics that provide comprehensive care for a shorter period that could satisfy most if not all medical home criteria for that period (eg, clinics that provide long-term treatment for hepatitis C virus infection).

The HITIDES study design had strengths and weaknesses. Strengths included adapting an evidence-based collaborative care intervention to HIV clinic settings, generalizability to the real-world patient population (eg, substance-dependent patients were not excluded), use of Web-based decision support to ensure fidelity to the intervention protocol, and use of an electronic medical record to facilitate communication between the HITIDES depression care team and the HIV and mental health care providers. Weaknesses included the potential lack of generalizability from VA to other treatment settings and the use of self-reported medication adherence data. However, a general VA outpatient depression collaborative care intervention found a significant correlation between self-report and administrative adherence data.

In conclusion, the HITIDES intervention was successfully implemented in HIV clinic settings and improved depression and HIV symptom outcomes. The HITIDES intervention may serve as a model for collaborative care interventions in other specialty physical health care settings where patients find their medical home.

Table 3. Unadjusted and Adjusted Continuous Outcome Results

<table>
<thead>
<tr>
<th>Groups, Intervention Effects</th>
<th>Unadjusted</th>
<th>Adjusted</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intervention</td>
<td>Usual Care</td>
</tr>
<tr>
<td>DFDs&lt;sup&gt;b&lt;/sup&gt;</td>
<td>12 mo</td>
<td>147.3</td>
</tr>
<tr>
<td>HIV severity&lt;sup&gt;c&lt;/sup&gt;</td>
<td>6 mo</td>
<td>−7.6</td>
</tr>
<tr>
<td></td>
<td>12 mo</td>
<td>−7.9</td>
</tr>
<tr>
<td>QWB-SA&lt;sup&gt;d&lt;/sup&gt;</td>
<td>6 mo</td>
<td>0.02</td>
</tr>
<tr>
<td></td>
<td>12 mo</td>
<td>0.01</td>
</tr>
<tr>
<td>SF-12V MCS score&lt;sup&gt;e&lt;/sup&gt;</td>
<td>6 mo</td>
<td>5.8</td>
</tr>
<tr>
<td></td>
<td>12 mo</td>
<td>7.1</td>
</tr>
<tr>
<td>SF-12V PCS score&lt;sup&gt;f&lt;/sup&gt;</td>
<td>6 mo</td>
<td>0.3</td>
</tr>
<tr>
<td></td>
<td>12 mo</td>
<td>1.7</td>
</tr>
</tbody>
</table>

Abbreviations: CI, confidence interval; DFDs, depression-free days; HIV, human immunodeficiency virus; MCS, mental component summary; PCS, physical component summary; QWB-SA, Quality of Well-Being Self-administered Scale; SF-12V, Medical Outcomes Study Veterans 12-Item Short-Form Health Survey.

<sup>a</sup>Effect sizes were not calculated when the intervention effect was not significant in the adjusted analysis.

<sup>b</sup>Covariate baseline measures were intervention, 20-item Hopkins Symptom Checklist (SCL-20) score, physical health comorbidity, HIV symptom index, marital status, annual household income, comorbid mental health, any inpatient mental health admission, and any depression treatment in the past 6 months.

<sup>c</sup>The 6-month baseline covariates were intervention, HIV symptom severity, SCL-20 score, physical health comorbidity, marital status, education, comorbid mental health, any inpatient mental health admission, any depression treatment in the past 6 months, acceptability of antidepressant (AD) medications, and HIV medication prescription. The 12-month baseline covariates were intervention, HIV symptom severity, SCL-20 score, physical health comorbidity, marital status, annual household income, comorbid mental health, any inpatient mental health admission, any depression treatment in the past 6 months, and HIV medication prescription.

<sup>d</sup>The 6-month baseline covariates were intervention, QWB-SA score, SCL-20 score, physical health comorbidity, HIV symptom severity, education, annual household income, comorbid mental health, any inpatient mental health admission, acceptability of AD medications, and HIV medication prescription. The 12-month baseline covariates were intervention, QWB-SA score, SCL-20 score, physical health comorbidity, HIV symptom severity, education, annual household income, comorbid mental health, any inpatient mental health admission, acceptability of AD medications, and HIV medication prescription.

<sup>e</sup>The 6-month baseline covariates were intervention, SF-12V MCS score, SCL-20 score, physical health comorbidity, HIV symptom severity, education, annual household income, comorbid mental health, any inpatient mental health admission, acceptability of AD medications, and HIV medication prescription. The 12-month baseline covariates were intervention, SF-12V MCS score, age, SCL-20 score, HIV symptom severity, comorbid mental health, any inpatient mental health admission, any depression treatment in the past 6 months, and HIV medication prescription.

<sup>f</sup>The 6-month baseline covariates were intervention, SF-12V MCS score, age, SCL-20 score, physical health comorbidity, HIV symptom severity, annual household income, and HIV medication prescription. The 12-month baseline covariates were intervention, SF-12V PCS score, SCL-20 score, physical health comorbidity, HIV symptom severity, marital status, and education.

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REFERENCES


